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THE
AMERICAN CYCLOPÆDIA.

VOL. IV.
CARMONA—CODDINGTON.

THE
AMERICAN CYCLOPÆDIA:

A

Popular Dictionary

OF

GENERAL KNOWLEDGE.

EDITED BY

GEORGE RIPLEY AND CHARLES A. DANA.

WITH SUPPLEMENT.

VOLUME IV.

CARMONA—CODDINGTON

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CARMONA

CARMONA (anc. *Carmo*; Moorish, *Karmunah*), a city of Spain, in the province and 20 m. N. E. of Seville, on the Carbones river; pop. in 1867, 20,074. It is a well built and handsome town, on an isolated hill commanding a magnificent view of the Andalusian valleys, and is surrounded by old and massive Moorish walls. Hardly any conspicuous remains exist of the many palaces and fountains of the Moorish era, excepting the superb ruins of the alcazar, which towers over the gate leading to Cor-



Carmona.

dova. This gate, built on Roman foundations, is celebrated for its beauty. There is a fine old Gothic church, with Pacheco's picture of the "Descent from the Cross," besides six other places of worship, nine convents, two hospitals, and a university. Woollen cloths, hats, leather, and other articles are manufactured; but the principal trade is in wine and olives, there being over 100 oil mills. The annual fair (April 25) is much resorted to.—Cæ-

CARMONTELLE

sar regarded Carmona as the most strongly fortified city of Further Spain, and Roman coins and other antiquities have been found here. The place was rescued from the Moors by Ferdinand III., king of Castile and Leon, in 1247; and the castle of Carmona was subsequently used for a long time as a royal residence and refuge in times of danger.

CARMONTELLE, or *Carмонтel*, a French playwright and artist, born in Paris, Aug. 25, 1717, died Dec. 26, 1806. He excelled as a writer of short plays (*proverbes*) adapted for private theatricals, and as an amateur artist. He became a great favorite in society, and was appointed reader to the duke of Orleans, as well as the director of festivities, and designer of the famous park of Monceaux, his exquisite taste being constantly called into requisition by the royal family and the fashionable classes. After the revolution he was saved from want by an amateur conferring a pension upon him of 4,000 francs, in consideration of the acquisition of his *transparents* (pastel paintings over 100 ft. long, which can be unrolled). He wrote and sketched with remarkable rapidity. His principal works are his *Proverbes dramatiques* (8 vols., Paris, 1768-'81); two additional volumes were published in 1811, and a new edition by Mme. de Genlis appeared in 1825 under the title of *Proverbes et comédies posthumes de Carмонтel*, in 3 vols. He also wrote more than 25 comedies contained in his *Théâtre de campagne* (4 vols., Paris, 1775), and several novels.

CARNAC, a town of Brittany, France, in the department of Morbihan, 18 m. S. E. of Lorient, and 9 m. by road from the station of Auray, on the railway from Brest to Nantes; pop. in 1866, 2,864. It is built on an elevation not far from the sea, and contains a fine church

to which pilgrims resort annually. The celebrated Celtic or druidical monument of Carnac, the most extensive in Brittany, consists of three groups with gaps between, running parallel with the coast, stretching across the country E. to W. for nearly 7 m., and all ter-



Carnac.

minating respectively in 11 rows of unhewn stones from 10 to 22 ft. high. Originally the avenues extended continuously for several miles, but the stones are being gradually cleared away for fences and agricultural improvements, so that at present there are several detached portions, which however have the same general direction. The first group is that called *le Bal*, after an enclosure of the same name which forms a rectangular area. The second group is that of the Dolmen, so called after the large Celtic stone in the shape of a table which stands in front of it. The third and most famous group, best known under the name of Maenac, after a locality of that name where the stones reach the highest point, terminates in front of a circular enclosure within the limits of the town. According to Sir John Lubbock, who visited this locality in 1867 with Dr. Hooker, the tumuli of Carnac, like most of those of Brittany, probably belong to the stone age. The tumulus of Mont St. Michel, about 380 ft. long and 190 ft. broad, with an average height of 33 ft., was found in 1862 to contain a square chamber with numerous Celtic remains. (See *Rapport à M. le préfet du Morbihan sur les fouilles du Mont St. Michel*, by M. René Galles, 1862.) A chapel is built on the summit of this tumulus, the roof of which commands the finest view of the monuments and surrounding scenery. The best map of the relics of Carnac is in possession of the London anthropological society. There are similar relics, though on a much smaller scale, at Erdeven, about 5 m. N. W. of Carnac.—See "Prehistoric Times," by Sir John Lubbock (2d ed., London, 1869), and another recent publication, "The Stone Avenues of Carnac," by the Rev. William Colling Lukis.

CARNARVON, or **Caernarvon**, the chief town of Carnarvonshire, Wales, a parliamentary and municipal borough, situated upon the Menai strait, at the mouth of the Seiont, 55 m. W. S.



Carnarvon Castle.

W. of Liverpool; pop. in 1871, 8,512. It is the terminus of railways from Bangor on the north and Pwllheli on the south. A railway also runs 8 m. to Llanberis, the point from which excursions are made for the ascent of

Snowdon. Carnarvon is frequented in summer for sea bathing, and there is a handsome bathing establishment, and a terrace walk along the strait, terminating in a pier. The harbor admits vessels of 400 tons burden. The older and smaller part of the town is surrounded by an ancient wall. At the S. W. corner of the town is a large castle, in the tower of which Edward II., the first English prince of Wales, was born. The castle with its courtyard is a mile in circuit. Over its gateway is a statue of Edward I. Carnarvon was the site of the Roman station Segontium.

CARNARVONSHIRE, a county of Wales, forming the N. W. extremity of the mainland, bordering on Cardigan and Carnarvon bays and Menai strait; area, 579 sq. m.; pop. in 1871, 95,694. A large part of the county is a peninsula which extends S. W. into the Irish sea. The Snowdon range of mountains occupies the centre of the county. Of this range Snowdon, 3,571 ft., is the highest point in Wales. Lakes are numerous, but the only river of importance is the Conway, which separates the county from Denbighshire. Not one fortieth of the county is arable land, but it is rich in minerals. The slate quarried here is one of the most important mineral productions of Great Britain; most of it is sent for shipment to Bangor. The suspension bridge built by Telford for the Great Holyhead railway, and the tubular bridge built by Stephenson for the Chester and Holyhead railway, span the river Conway and the Menai strait.

CARNATIC, an ancient province of British India, on the E. coast of the peninsula, extending from Cape Comorin to lat. 16° N., with an average breadth of about 90 m.; area, about 50,000 sq. m.; pop. estimated at 7,000,000. The province is separated into two parts by the Eastern Ghauts, which run parallel with the coast, and which cause a considerable difference in climate between the table land and the seaboard; the latter in dry weather is the hottest part of India, the thermometer sometimes standing at 130° in the shade. The principal rivers are the Pennar, the Palar, and the Coleroon. The inhabitants are chiefly Hindoos. The Carnatic includes the cities of Madras and Pondicherry, besides the important towns of Arcot, Madura, Tanjore, Trichinopoly, Nellore, and Vellore. It originally formed the Hindoo kingdom of Carnata, and after various changes was finally included in the dominions of the nabob of Arcot; and the contentions arising from a disputed succession first brought the French and English into collision, and ended in the transfer of the Carnatic to the East India company in 1801, the reigning nabob, Azim ul-Omrah, receiving a pension equal to one fifth of the revenue, and his chief officials being provided for. The last titular nabob died in 1855, without heirs. The Carnatic is now included within the administration of the presidency of Madras. The principal occupation of the inhabitants is agriculture, the

land being held either by Brahmans, who cultivate it by hired labor, or by the farmers themselves. Rice is the chief production, of which two crops a year are raised where the facilities of irrigation are good. Cotton is raised in favorable situations, and upon the high land in the interior of the province millet, sugar, and indigo are produced.

CARNÉ. I. Louis Marcein, count de, a French author, born at Quimper, Feb. 17, 1804, died Feb. 13, 1876. He early entered the diplomatic service. In 1839 he was elected deputy, and in the chamber was a follower of Lamartine. He opposed the Pritchard indemnity and other measures of Guizot's foreign policy, but in 1847 accepted the presidency over the commercial department in the ministry of foreign affairs, retiring after the revolution of Feb. 24, 1848. He was elected a member of the academy in 1863. In 1869 he was defeated as an ultramontane candidate for the legislative body. His numerous publications include *Études sur l'histoire du gouvernement représentatif en France* de 1789 à 1848 (2 vols., 1855), and *Études sur les fondateurs de l'unité française* (2 vols., 1848-'56).

II. Louis de, son of the preceding, born in Brittany in 1843, died there in 1870. After having finished his studies, he was admitted in 1863 to the commercial department of the ministry of foreign affairs; and his uncle, Admiral La Grandière, exciting his interest in Cochinchina, he was appointed by Drouyn de Lhuys in 1865 secretary of the scientific mission to the Mekong. He distinguished himself as an explorer, and wrote *Voyage en Indo-Chine et dans l'empire chinois*, edited by his father after his death (Paris, 1872; translated into English, London, 1872).

CARNEADES, a Greek philosopher of the Skeptic school, considered as the founder of the third or new academy, born at Cyrene about 213 B. C., died in 129. Of the incidents of his life very little is known, but of his brilliant qualities as a philosopher and rhetorician there is abundant testimony in the works of classic authors. In Athens he became a student of the Stoic and Skeptic doctrines, especially those of Chrysippus, of whom he afterward became the most formidable opponent. His eloquence was considered so irresistible, his logic so forcible, that more than a century later Cicero said, "Him I would not care to challenge in debate, but would rather propitiate him, and implore his silence." It is related of him that having been sent to Rome as one of three commissioners of the Athenian commonwealth, he one day made a speech in favor of justice, and the next day one in opposition. His arguments on either side were so convincing, and seemingly unanswerable, that Cato, fearing lest the public mind should be corrupted by such an exhibition of plausible arguments for immorality and injustice as well as for morality and justice, insisted upon a speedy settlement of the diplomatic business for which Carneades had come to Rome, and his prompt dismissal from the

city. He was not an author, but transmitted his doctrines to his disciples by word of mouth, like Socrates. So far as the philosophy of Carneades is known, its substance may be condensed thus: Every perception is a certain change or movement in a sensible being, bringing to consciousness first itself, and secondly some object without. In respect to the object, the perception is either true or false; in respect to the one who perceives, either probable or improbable. There exists no test to decide on the truth or untruth of a perception, that is to say, on the relation which the perception bears to the object by which it is caused. There is no objective certainty, or guarantee that real existing things are essentially reproduced by the human perception; but whatever the relation of human perception to reality, to man himself the mere probability, the test of which lies within the limits of his mind, is sufficient for all practical purposes. Thus much may be designated as the affirmative portion of the philosophy of Carneades; the practical portion was his criticism of the then existing philosophical system, a criticism based merely upon the supposition that the affirmations and negations of human language comprise all existing possibilities, so that if both should be refuted a *non est* would be proven. Carneades pretends to prove the non-existence of God by the following reasoning: God is either a rational and sensitive being, or he is not. If he is, then he would be subject to sensations agreeable and disagreeable, to likes and dislikes; but if so, he would be a changeable being, and, as such, liable to destruction. On the other hand, if God is not a rational and sensitive being, then he could not have been the creator of reason and sensation. Again: God is either finite or infinite. If the latter, then he would be motionless, and therefore inactive; if the former, there would be something that was more than he, because limiting him. By similar arguments he gets rid of all general ideas of morality, human rights, duties, &c. But when he seems to have destroyed everything, he suddenly turns round, concluding that all these arguments prove merely that absolute metaphysical knowledge is as unnecessary as it is impossible; that man ought to be satisfied with probabilities and expediences, which are amply sufficient to secure his well-being.

CARNEIA (Gr. *κάρνεια*), a national festival of the Spartans, celebrated in honor of Apollo, and in the Spartan month Carneios (August). The festival lasted nine days, during which the Spartans were not allowed to enter upon a hostile campaign.

CARNELIAN (Lat. *caro*, gen. *carnis*, flesh; called by the ancients *sarda*), a clear red chalcedony, one of the numerous varieties of the quartz family of minerals. (See AGATE.) It is found resembling flesh in its colors, whence its name. By exposure to the sun and baking, the colors are deepened. Together with agates, carnelians are quarried in great quantities in differ-

ent parts of India, particularly in the region of Cambay, whence the name commonly applied to them all of Cambay stones. They are also brought to the lapidary workshops at Cambay from different parts of Guzerat, to be worked up into round and flat necklaces, beads, bracelets, armlets, seals, marbles, chess men, studs, rings, &c., which give employment in their manufacture to nearly 2,000 people. Between the Bowa Gore and Bowa Abbas hills, on the plain, are small mounds, in which the stones are quarried by the Bheels of the district. They sink shafts, and excavate horizontal galleries, working underground with lamps. The stones, being brought to the surface and sorted, are purchased of the miners in the village of Ruttunpoor, by the contractor or his agents. When a considerable quantity is collected, a trench is dug in a field two feet in depth and three in breadth. In this a fire is made with the dung of goats and cows, and upon it earthen pots containing the stones are placed in rows. The fire is kept up from sunset to sunrise, when the pots are removed, and the stones piled away. These once a year are carted to Nemodra, then sent down the river in canoes to Broach, and thence in boats to Cambay. The manufacture of beads from the rough stone is thus conducted: The stones, brought to a convenient size, are chipped into a rounded form upon the point of an iron, standing inclined in the ground. Another workman then takes them, and fixing a number of equal size in wooden or bamboo clamps, rubs them on a coarse, hard polishing stone; they are then transferred to another man, who secures them in clamps, and rubs them on all their sides against a ground polishing board, smeared with a composition of emery and lac. The final polish is given by putting several hundreds or thousands of the beads into a stout leathern bag, about 2 ft. long and 10 or 12 in. in diameter, with some emery dust and the carnelian powder obtained in boring the holes through the beads. The mouth of the bag is tied up, and a flat thong is bound around its centre. Two men seated at opposite ends of a room then roll it back and forth between them, keeping up the operation from 10 to 15 days, the bag being kept moistened with water. When the beads are well polished, they are passed to the workmen who bore the holes. This is done by means of a steel drill tipped with a small diamond, the work being kept wet by water dripping upon it.—Carnelian is a common mineral in many localities in the United States, especially on Lake Superior, in Missouri, and on the upper Mississippi. It is used for numerous articles of jewelry, and is cut on a leaden plate with emery, and polished on wood with pumice stone.

CARNICER, Ramon, a Spanish composer, born at Tarrega, Oct. 24, 1789, died in Madrid, March 17, 1855. He studied music, chiefly in Barcelona, and was more than ten years leader of the orchestra in the opera there, till 1828, when

he went to Madrid, and became in 1830 professor at the conservatory of music. Between 1827 and 1845 he composed many operas, the most successful of which were *Adela de Lusignano* and *Colombo*. He also excelled in church music and in popular ballads.

CARNIOLA (Ger. *Krain*), a duchy in the Cis-leithan half of the Austro-Hungarian monarchy, bounded N. by Carinthia, N. E. by Styria, E. by Croatia, S. by Croatia and the Coastland, and W. by the Coastland; area, 3,857 sq. m.; pop. in 1870, 466,334, of whom 93 per cent. were Slovenes, the remainder mostly Germans. Nearly the entire population belongs to the Catholic church, all others numbering less than 1,500. It is a mountainous region, traversed by branches of the Julian Alps, abounding in grottoes, caverns, and underground passages, and presenting many snow-capped summits, several of which are about 10,000 ft. high. It is neither so well watered nor so fertile as the neighboring districts of the empire, the only rivers of note being the Save and the Kulpa, and the lakes being mostly very small. The southern part produces fruits and a fine variety of flax; bees and silkworms are extensively reared, and in some districts wheat, barley, and the grape are largely cultivated. With minerals Carniola is richly gifted. Its famous quicksilver mines at Idria, next to Almaden in Spain the richest of Europe, once produced upward of 16,000 cwt. per annum, and still yield about 6,400 cwt. Iron, lead, coal, marble, clays, and precious stones are also found. There are manufactures of iron, steel, fine linen, woollen, flannel, worsted stockings, lace, leather, wooden ware, &c. The exports comprise several of the above articles, together with hats, glass, wax, wine, and flour; and the imports, salt, oil, coffee, sugar, tobacco, cloths, cattle, and fruit.—Carniola was subdued by the Romans at an early period, and was occupied by Slavs in the 6th century. It was Christianized in the 8th century, became a margraviate in the 10th, was afterward partly under the sway of the dukes of Austria and Carinthia, and in the 12th century was erected into a duchy. It was then held by the powerful dukes of Tyrol, until the extinction of that family in 1335, when it passed into the hands of the counts of Görz, who were succeeded by the house of Austria in 1364. By the treaty of Vienna in 1809 it was ceded to France and incorporated in the kingdom of Illyria, but restored to Austria in 1814. The Carniolan diet is composed of the *Landeshauptmann*, the prince-bishop of Laybach, and 30 delegates. Capital, Laybach.

CARNIVAL, a festival observed in most Roman Catholic countries immediately before the commencement of Lent, but celebrated with more parade in Rome and Venice than any other cities. Its name is derived from the Latin *carni vale*, farewell to meat, as from Ash Wednesday, the first day of Lent, a strict fast is observed for 40 days. Much dispute exists

as to the origin of this festival, but it has probably come down from the Saturnalia of pagan Rome, modified by the early Christians into a feast during the several days preceding the great fast of 40 days, generally supposed to have been instituted by Telesphorus, bishop of Rome, before the middle of the 2d century. The carnival appears to be most suited to the genius of the Italian people, being kept up by them with undying spirit, while in other lands it has frequently languished or fallen into neglect. The only relic of it remaining in England, or ever introduced into the English portions of North America, consists in the observance of Shrove Tuesday. In Paris the carnival takes place during the five or six weeks preceding Ash Wednesday, and is marked by the frequency of masked and fancy balls in private society, and at the various places of public amusement; such balls, to which the public is indiscriminately admitted, having been first permitted by the regent duke of Orleans. During the festivities, masks appear in the streets only on the Sunday, Monday, and Tuesday preceding Lent, and at Mi-Carême or Mid-Lent Thursday. On these days persons in disguise, many of them masked, and exhibiting all sorts of folly, parade the streets, and immense crowds in carriages, on horseback, or on foot, assemble to witness the gayeties of the scene. The carnival was prohibited in 1790, and no more celebrated until the appointment of Bonaparte as first consul. Its restoration was a cause of great joy to the Parisians, and for some years nothing could exceed the beauty and richness of the costumes displayed upon this annual festival; but it has now lost many of its charms, and the masks are comparatively few. After parading the streets, the masks repair for the night to the various masked balls of every description, which then abound in the capital. The public masked balls take place on fixed days throughout the carnival, being given at almost all the theatres. The procession of the *bœuf gras* (the fat ox) has for ages been celebrated at Paris on the Sunday and Tuesday before Lent, when the government prize ox, preceded by music, and accompanied by a numerous train of butchers fantastically dressed, is led through the streets. The ox is covered with tapestry, and his head adorned with laurel. Formerly the ox bore on his back a child, called *roi des bouchers* (king of the butchers), decorated with a blue scarf, and holding a sceptre in one hand and a sword in the other. He now follows the ox in a triumphal car, but without his sword and sceptre.—The carnival in Italy is much the same in the different cities where it is celebrated; that of Venice is by no means as brilliant as in former days, and it will be therefore sufficient to describe that of Rome. It extends over the eleven days which immediately precede Ash Wednesday, though only eight days are actually given up to its festivities, the two Sundays and Friday not being included, from

motives of religion. The festivities are held in the Corso, and the streets immediately adjoining, to which the show is confined. The Corso is about a mile long, but very narrow, being on an average only about 35 ft. broad, and lined by lofty houses, nearly all of which are built with overhanging balconies, with especial reference to this spectacle; and where permanent balconies are wanting, temporary structures of wood are frequently erected. Thus persons on opposite balconies are brought within speaking distance, or near enough to exchange bouquets and sugar-plums. The street beneath is densely filled with carriages and foot passengers, and all are brought so close together as to act and react upon each other. The sport does not last through the whole of each day, but only from about 2 o'clock till dark, during the short days of February. Pieces of brilliant cotton, cloth, or silk, red, yellow, and blue, are hung over the balconies, while innumerable streamers of the same hues flutter in the breeze. Far as the eye can reach, the balconies are crowded with spectators, many of them beautiful and gayly dressed women. The course below is thronged with two rows of carriages, moving in opposite directions and filled with gay parties; while crowds of pedestrians mingle among the vehicles, clad in every variety of costume that fancy can suggest, masked, and playing every imaginable prank within the bounds of decency. Meanwhile all engage in pelting each other far and near with flowers, bonbons, and confetti. For some time before the carnival begins flowers are brought into Rome in exhaustless profusion, costly bouquets of hot-house flowers being ranged side by side with the wild growth of the Campagna. The bonbons are not so abundant, but still are used extensively; while the confetti, which are nothing but pellets of lime about the size of a pea, are scattered in myriads, and cover those attacked from head to foot with lime dust. Every day of the masquerade the Corso becomes more crowded and more animated, till on the last the number and spirit of the masks, the skirmishes of bonbons and lime dust, and the shouts and enthusiasm of all, surpass description. Of the mass who elbow one another through the crowded streets, the greater part are in their ordinary garb, though disguises are common enough not to attract any particular notice. Among the most usual masks are punchinellos, harlequins, and pantaloons. Some of the masks carry an inflated bladder on the end of a stick, with which they deal noisy but harmless blows. Besides carriages such as are seen every day, many are put together for the occasion merely, and consist of framework resting upon wheels, and made to assume various shapes, such as ships or moving forests. Every day of the masquerade there is a race by spirited horses, but without riders. About 5 o'clock preparations begin for the running of these animals. Mounted dragoons trot up and down the Corso,

the carriages are withdrawn into by-streets, and pedestrians alone are left. Meanwhile the horses which are to run have been brought to the starting point in the piazza del Popolo. Each one is held by his groom in a showy uniform, and they are kept within bounds until the hour for starting arrives by a rope stretched across the Corso. They are goaded on in the race by metal balls full of sharp points, which are fastened to their trappings. The goal is formed by a piece of cloth suspended across the street near the Venetian palace, at the *Ripresa de' Barberi*, so called from Barbary horses being the original racers. At this point the judges are assembled to decide upon the race. Goethe, who visited Rome in 1788, says that carriages were then allowed to remain in the Corso, and their presence rendered it so narrow that horses often dashed themselves against the wheels and were instantly killed. Of late years, the celebration of the carnival in Rome has lost much of its ancient splendor and interest.

CARNIVORA (Lat. *caro*, gen. *carnis*, flesh, and *voro*, to eat), an order of mammals which feed upon flesh, as distinguished from the *herbivora*, or vegetable feeders. This order has been divided into various groups by different authors, some including in it the *cheiroptera* and *insectivora*, and others limiting it to the following five families, which agree in their most essential characters, viz.: *ursidae*, or bears; *mustelidae*, or weasels; *canidae*, or dogs; *felidae*, or cats; and *phocidae*, or seals. The bears constitute the plantigrades, the seals the pinnigrades, and the other three the digitigrades, according as the whole foot or only the toes touch the ground, or as the extremities are modified into fin-like paddles. The *felidae* are the most truly carnivorous, and constitute the type of the order; and in them the large canine teeth, sharp retractile claws, and great strength and agility indicate a special formation for the pursuit and destruction of living prey. The skeleton exhibits the modifications adapted for the manner of life in the shape of the bones, their articulations, and proportions. In the *felidae* the spine is flexible, yet strong, with a large development of the lumbar portion; the ribs are narrow and far apart, the limbs long and affording the greatest freedom of motion, and the skull short and broad. In the weasels the spine is lengthened in accordance with the habits of these prowling creatures. In the bears the foot is placed wholly on the ground, and the shortness of the lumbar region of the spine adds to the firmness and strength of limb required in these less carnivorous animals. In the seals the posterior limbs are extended backward into two horizontal fins, the anterior also serving in addition for a limited progression on land. The cranium is remarkable for the shortness and strength of its facial or tooth-bearing portion, and for the crests and large fossæ for the accommodation of the powerful muscles of mastication; in the cats the tentorium cere-

belli is bony, evidently to protect the brain during the sudden movements of leaping upon their prey, and the whole bony structure is remarkably solid; the lower jaw is strong and short in proportion to the carnivorous propensity of the genus. The vertebrae of the neck are remarkable for the size of the first two; the dorsals and the number of ribs vary from 13 (the most common) to 16; the lumbar vertebrae, always numerous in proportion to the leaping powers, vary from 4 to 7; the sacrum is composed of several vertebrae, and in the bears is remarkably broad, for the support of the body in their frequently erect position; the tail is the longest in the most active species, as in the lion and the panther. The shoulder blade is flat and broad; the clavicle, when not entirely wanting, is quite rudimentary; the humerus is arched, short, and strong; the bones of the forearm have but little motion on each other, except in the *ursidae*, and the ulna is generally placed behind the radius, both of them in the seals being broad and flat; the metacarpus is much larger in the digitigrades than in the plantigrades. The retractile claws of the *felidae* are described in the article CAT, in which family they are most developed. The pelvis is short, and its bones broad and flat; the thigh bone is moderately long, and directed immediately downward, except in the seals, in which its direction is outward. The bones of the leg are generally separate; the tarsus consists of the usual five bones, but the tuberosity of the os calcis is quite long and strong; the inner metatarsal bone in the cats and dogs is merely rudimentary; in the weasels the inner toe is small, in the cats wanting, and in the plantigrades in the same range as the others; in the plantigrade foot everything is arranged for slow and steady walking, in the digitigrade for leaping and tearing, and in the pinnigrade for swimming. The muscles in this order, especially of the jaws, neck, and anterior extremities, are enormously large and powerful. In the typical carnivora, the incisor teeth are small, and placed in the intermaxillary bone; the canines, situated above, at the junction of the intermaxillaries with the superior maxillaries, are strong, long, and cutting, slightly curved, and admirably adapted for tearing their prey; the cheek teeth have cutting edges, the lower shutting within the upper like the blades of scissors, and are provided with sharp triangular processes; the teeth are arranged in a short space, and their action is rendered more efficacious by the shortness of the whole jaw, and by the simple hinge-like motion of the lower jaw; in the seals the canines are much smaller, but the cheek teeth are furnished with numerous sharp points for the purpose of holding the slippery and scaly fish upon which they feed; in the bears the jaws are much longer, and the molars are flattened and tubercular, indicating the far less carnivorous propensities of this family. The carnivora, in proportion to their approach to the typical *felidae*, whose food when swallowed

is so like their own tissues that it is ready for speedy assimilation, have a short intestinal canal; in the lion it is but three times the length of the body, and has very few internal folds, and a very small caecum, while in man it is five times as long, in the horse 10 times, in the sheep 28 times; such is the relation between the organs, that the form of the teeth indicates the character of the intestinal canal, the armature of the feet, the mode of progression, and very nearly the habits and mode of life of an animal. The lobes of the liver vary in number from four in the badger to eight in the lynx, without any apparent physiological reason; the hepatic ducts correspond in number to the lobes, and the common duct, before it enters the intestinal cavity, frequently receives a pancreatic duct; the gall bladder is always present, and in the *ursidae* is of great size; the pancreas and spleen do not differ, except in form, from these organs in other mammals; the chyle is so noted for its opacity and whiteness, that the discovery of the lacteals was made in these animals long before they were seen in man. The carnivora belong to the sub-class *gyrencephala* of Owen, in which the cerebral hemispheres are the largest developed (except in man), extending over a portion of the cerebellum and the olfactory lobes; in this arrangement they are next to the *quadrumana* or monkeys; the hemispheres have well marked though simple convolutions. The organs of sense are well developed; in the diurnal carnivora the pupil is round; in the cats it is elongated vertically, and in a very bright light almost linear, but it is round in the dark, causing the brilliant *tape-tum* of the posterior arch of the choroid to appear like a ball of fire; the large size of the mastoid process, communicating with the cavity of the tympanum, indicates considerable acuteness of the sense of hearing, necessary for animals seeking their prey during the stillness of night; the sense of smell, especially in the *canidae*, is very acute, and the pituitary membrane is extended greatly by means of the complicated convolutions of the turbinated bones; the sense of taste is probably not very acute, and the tongue of the cats is covered in its middle portion with horny spines, well calculated to tear the flesh from bones. The kidneys in some families, as in the bears and seals, are much subdivided, resembling a bunch of grapes; in the cats the divisions are hardly perceptible. In the civets and allied genera there are glandular follicles, which secrete a peculiar odorless substance, sometimes exceedingly fetid; the glands are usually situated near the anus, and the excretory ducts open between the rectum and the genital organs. The testes are generally pendulous and external, but in the seals they remain permanently within the abdominal cavity; the vesiculæ seminales do not exist, but organs resembling the prostate and Cowper's glands are generally found; in almost all there is a bone in the penis, the hyæna forming an exception, it is said; the teats are abdomi-

nal, ranging from four in the lioness to ten in the bitch; the placenta is zonular, surrounding the fœtus.—The geographical distribution of the carnivora is very extensive, but the largest and most destructive species are confined to the tropics of the old world; the tiger is limited to Asia, the lion to Asia and Africa, the cougar to America; the largest bears frequent the arctic regions, and the largest seals the antarctic waters. The carnivora fulfil an important purpose in the economy of nature, by keeping in check the increase of the herbivorous animals, whose countless numbers would otherwise destroy vegetation, and thus cause their own and a general destruction.—Cuvier associated under the name *carnassiers* the cheiroptera, insectivora, carnivora, and marsupials; excluding the latter, which form a sub-class by themselves, many more recent authors adopt a somewhat similar classification. Prof. Agassiz, in his "Essay on Classification," divides mammals into three orders, *marsupialia*, *herbivora*, and *carnivora*, the last the highest in the scale. Prof. Owen divides his sub-class *gyrencephala* into the three primary divisions of *mutilata* (including the cetaceans), *ungulata* (pachyderms and ruminants), and *unguiculata* (carnivora and the monkeys), the last being the highest in development; in the *unguiculata* the sense of touch is more highly developed through the greater number and mobility of the digits, and the smaller extent of covering with horny matter; in the carnivora he places the digitigrades at the head, then the plantigrades, and lastly the pinnigrades; and among the digitigrades the *felidæ* are placed highest, whose retractile claws and long and narrow hind foot make them the most perfect and typical form of the carnivora.

CARNOCHAN, John Murray, an American surgeon, born in Savannah, Ga., in 1817. His father, who was a Scotchman, sent him when a boy to Edinburgh. After graduating in the high school and university of that city, he returned to the United States, and entered the office of Dr. Valentine Mott of New York as a student of medicine. After taking his degree, he again visited Europe, and passed several years in attendance upon the clinical lectures of Paris, London, and Edinburgh. In 1847 he commenced the practice of his profession in New York. In 1851 he was appointed surgeon-in-chief of the New York state emigrant hospital. In 1852 he successfully treated a case of *elephantiasis Arabum* by ligature of the femoral artery. In the same year he performed the operation of amputating the entire lower jaw, with disarticulation of both condyles. In 1854 he exsected the entire ulna, saving the arm, with its functions unimpaired; and subsequently, in another case, removed the entire radius with equal success. In 1856 he performed for the first time one of the most startling and original operations on record, in exsecting for neuralgia the entire trunk of the second branch of the fifth pair of nerves, from

the infra-orbital foramen, as far as the *foramen rotundum* at the base of the skull. Amputation at the hip joint he has performed several times; once in 1864, after the battle of Spottsylvania. Among his more recent operations are the ligature of both common carotid arteries in a case of elephantiasis of the head, neck, and face; the ligature of the common carotid on one side, and of the external carotid on the other, for hypertrophy of the tongue; and the tying of the femoral artery for varicose veins of the leg and thigh. He has also been successful in the removal of large ovarian tumors. From 1851 to 1863 Dr. Carnochan was professor of the principles and operations of surgery in the New York medical college, and published his lectures on partial amputations of the foot, lithotomy, and lithotrity, and also a "Treatise on Congenital Dislocations" (New York, 1850), and "Contributions to Operative Surgery" (Philadelphia). He has translated Sedillot's *Traité de médecine opératoire, bandages et appareils*, and Karl Rokitan-sky's *Handbuch der pathologischen Anatomie*. From 1870 to 1872 he was health officer of the port of New York.

CARNOT. L. Lazare Nicolas Marguerite, a French statesman and tactician, born at Nolay, Burgundy, May 13, 1753, died in Magdeburg, Prussia, Aug. 2, 1823. When only 18 he was made a second lieutenant of engineers; two years later he was first lieutenant; in 1783 captain, in which year he wrote an essay on aerial navigation and a eulogy of Vauban, which brought him into controversy with Gen. Montalembert, who caused him to be arrested and confined in the Bastille. He had also published about the same time an *Essai sur les machines*, in which he demonstrated a new theorem upon loss of motive power, which Arago declared to be one of the greatest and most useful discoveries of the age. He did not at first actively participate in the revolution, although he submitted to the national assembly a memoir with a view to a restoration of the finances. In 1791 he was elected deputy to the legislative assembly by the department of Pas-de-Calais, and devoted himself assiduously to his new duties. As a member of the committee on military affairs, he greatly contributed to the adoption of the decree ordering a large addition of forces to the national guard; and it was in accordance with his report that, for want of muskets, the new guards were armed with pikes. The efficacy of these weapons was soon tried, Aug. 10, 1792, in the assault against the Tuileries. In the following month he was elected to the convention, and was present on the trial of Louis XVI.; his vote was recorded in these words: "In my opinion, both justice and good policy require the death of Louis; but I must confess that never a duty so heavily weighed on my heart as the one that is now incumbent upon me." He was neither a Girondist nor a montagnard, but upon the fall of the former party he did not hesitate to side with the lat-

ter. In August, 1793, he entered the committee of public safety. The armies were demoralized; there were no funds, no provisions; enemies had invaded France in every direction; the insurgent Vendéans were successful; the city of Lyons kept at bay the besieging army; and Toulon had been just delivered into the hands of the English. Carnot went boldly to work, and succeeded so well that his fellow citizens declared emphatically that he had "organized victory." He proved himself to be not only a skilful administrator, but a strategist of the highest ability. The 14 armies created by the rising *en masse* of the nation coöperated under his orders in the execution of a well devised plan; they were placed under the command of new generals able to understand the projects of the directing mind, and defeats were soon succeeded by brilliant victories. Carnot sometimes repaired in person to the weakest or most exposed point to watch the operations, and to inspire the troops with his ardor and confidence. A victory was won at Wattignies, which forced the prince of Coburg to retreat; Toulon was retaken from the English; the Vendéans were defeated and almost destroyed; and the Austrian army was expelled from France. As a member of the committee of public safety, Carnot, being entirely absorbed in the performance of his especial duties, left the interior administration in the hands of his colleagues, and was scarcely aware of the atrocities which were perpetrated in the name of the committee. Thus he did not participate in the revolution of the 9th Thermidor; but after the fall of Robespierre he energetically defended his colleagues, Collot-d'Herbois, Billaud-Varennes, and Barère, charged with being the accomplices of the man in whose overthrow they had been instrumental. Carnot was on the point of being arrested, and was only saved by Bourdon de l'Oise exclaiming, "This is the man who has organized victory." After the 1st Prairial, 1795, he was again threatened with impeachment, and was obliged to leave the committee and give up the management of war affairs, which he had held for nearly two years. On the establishment of the directory, he was elected representative by 14 departments at once, and took his seat in the council of 500. Being appointed one of the five directors, he resumed his previous office and planned the admirable campaign of 1796, the success of which was secured in Italy by Bonaparte. After the *coup d'état* of the 18th Fructidor, Carnot was condemned to transportation, but escaped to Switzerland, and afterward to Germany, where he wrote a memoir to vindicate his conduct. After the 18th Brumaire he returned to France, and was appointed minister of war in 1800; but being unable to agree with Bonaparte, he resigned. In 1802 he was elected to the tribunate, where he voted against the establishment of the legion of honor, the consulate for life, and espe-

cially the empire. On the suppression of the tribunate he retired to private life, and resumed his scientific pursuits. But in January, 1814, he addressed a letter to Napoleon, proffering his services: "I staid away as long as you were prosperous; now that misfortune has come, I do not hesitate to place at your disposal what little ability I may still possess." Napoleon at once intrusted him with the command of Antwerp. For years the supreme director of military affairs, he had gained no advancement in the army, and was still merely a major. Napoleon had to promote him to the rank of general, passing him through all the intermediate degrees at once. He defended Antwerp until the treaty of Paris, April, 1814, and returned to the capital, where he published a *Mémoire au roi*, full of liberal opinions and wise advice. On Napoleon's return from Elba, he appointed Carnot minister of the interior, which post he held for three months, during which he received the title of count of the empire, but never bore it. After the rout of Waterloo he almost alone preserved his self-possession, and suggested energetic measures, which were not adopted. "I have known you too late," said Napoleon on his departure. A member of the provisional government, his honesty was not a match for Fouché's shrewdness. On the second restoration he was again outlawed, and retired to Warsaw, then repaired to Magdeburg, where he died. His writings are numerous; besides his various political papers, he left disquisitions of great interest on several points of science, especially on fortification. A biography of Carnot was published by D. F. Arago (Paris, 1837). **II. Lazare Hippolyte**, a French statesman, son of the preceding, born at St. Omer, April 6, 1801. He was of liberal opinions, became a disciple of St. Simon, and wrote the *Exposition générale de la doctrine Saint Simonienne*, the authorship of which was, with his consent, ascribed to Bazard. But as soon as St. Simonism assumed the form of a religious creed, Carnot parted with his friends, and became a journalist, and the chief editor of the *Revue encyclopédique*. He was also intrusted with the publication of Grégoire's and Barère's *Mémoires*. He was elected to the chamber of deputies in 1839, and reelected in 1842 and 1846. After the revolution of February, 1848, he was minister of public instruction till July 5, and improved the condition of the teachers, rendered the normal schools free, and established free lectures. In 1848 he was elected to the constituent, and on March 10, 1850, to the legislative assembly. After the *coup d'état* of Dec. 2, 1851, he left France; during his absence he was elected a member of the *corps législatif*, but refused to take the oath. He was reelected in 1857, but again refused to serve. In 1863 he was elected from Paris, and took his seat. He was again a candidate in 1869, but was defeated by Gambetta. In 1861 he commenced the publication of *Mémoires sur Carnot, par son fils*.

CARNUNTUM, an ancient Celtic town in the N. part of Pannonia, on the Danube, near where Hainburg now stands, 26 m. E. of Vienna. It was an important military pass under the Romans, who made it at one time a station for their fleet on the Danube, and raised it to the position of a *municipium* according to some inscriptions, of a colony according to others. During the wars with the Marcomanni and Quadi it was for three years the residence of Marcus Aurelius, who here composed a part of his "Meditations." It was destroyed by the Germans in the 4th century, was afterward rebuilt, became once more a Roman military station, and was finally destroyed during the wars with the Magyars in the middle ages. Its remains are very extensive.

CAROLAN, or **O'Carolan**, Turlough, an Irish bard, born in the county of Westmeath in 1670, died in 1738. Having lost his sight when a child, he remained blind for the rest of his life; but having learned to play on the harp, he became famous for his musical and poetical genius, and is still remembered as the last and greatest of the Irish bards.

CAROLINA. See **NORTH CAROLINA**, and **SOUTH CAROLINA**.

CAROLINA MARIA, queen of Naples, daughter of the emperor Francis I. of Austria and Maria Theresa, born in Vienna, Aug. 13, 1752, died at Schönbrunn, Sept. 8, 1814. In 1768 she was married to Ferdinand IV., king of Naples, over whom she exercised great influence, which led to fatal results, especially when, in 1784, she prevailed upon the king to appoint her favorite Joseph Acton prime minister. A great share of the odium of Acton's unwise measures fell upon the queen. In 1798 Ferdinand, at the instigation of Carolina, declared war against the French republic; but after the defeat of the Austrian army under Mack, the French marched upon Naples, and the royal family were compelled to fly to Sicily, and to put themselves under British protection. Cardinal Ruffo's agitation in Calabria against the French and the Neapolitan republicans permitted the king to return to Naples in 1799; but here new intrigues were opened by Carolina, who on this occasion had the pernicious assistance of Lady Hamilton. In 1805 Carolina joined the coalition against Napoleon, but notwithstanding the assistance given to Naples by Russia and England, she and her husband were again expelled from their dominions. She went to Vienna in 1811, and died before the restoration of Ferdinand IV. to the throne. She was notoriously ambitious of political power, which, however, she was unable to manage, although possessed of some ability.

CAROLINE. **I.** An E. county of Maryland, bordering on Delaware, intersected by the Choptank and Marshy Hope rivers, and bounded N. E. by Tuckahoe creek; area, 300 sq. m.; pop. in 1870, 12,101, of whom 3,758 were colored. The surface is flat and the soil sandy. The Maryland and Delaware railroad passes

through the N. part, and the Dorchester and Delaware railroad touches the S. E. corner. The chief productions in 1870 were 130,728 bushels of wheat, 342,971 of Indian corn, 37,948 of oats, 27,302 of Irish and 17,141 of sweet potatoes, 98,591 lbs. of butter, and 9,397 of wool. There were 2,155 horses, 2,283 milch cows, 3,126 other cattle, 2,826 sheep, and 6,672 swine. Capital, Denton. **II.** An E. county of Virginia, bounded N. by the Rappahannock, and intersected by the Mattaponi; area, 480 sq. m.; pop. in 1870, 15,128, of whom 8,038 were colored. The surface is diversified, and the soil of the river bottoms is good. The Richmond, Fredericksburg, and Potomac railroad passes through it. The chief productions in 1870 were 63,462 bushels of wheat, 214,968 of Indian corn, 30,194 of oats, and 417,848 lbs. of tobacco. There were 1,203 horses, 1,733 milch cows, 2,129 other cattle, 1,900 sheep, and 4,607 swine. Capital, Bowling Green.

CAROLINE AMELIA AUGUSTA, queen of England, daughter of Duke Charles William Ferdinand of Brunswick and the princess Augusta of England, born May 17, 1768, died Aug. 7, 1821. In 1795 she married her cousin, the prince of Wales, but in the ensuing year, after she had borne him a daughter (Charlotte), the prince, who had married her reluctantly, separated from her, and Caroline retired to a residence at Blackheath. Looked upon as the victim of a profligate husband, her position excited much sympathy from the people at large, but at the same time subjected her to serious charges on the part of her enemies. In 1808 George III. instituted an inquiry into her conduct, which absolved her from any positive dereliction of duty, but without acquitting her of improprieties of conduct. In 1814 she received permission to visit her native town and to travel in Italy and Greece, and subsequently resided chiefly in a villa on the lake of Como. Her relations with Bergami, an Italian connected with her household, who accompanied her in her travels, gave rise to a new series of rumors disparaging to her honor. On Jan. 29, 1820, her husband ascended the throne as George IV., when a pension of £50,000 was offered her on condition that she should never return to England. She rejected this offer, and arrived in England in June of the same year, the people, who never withdrew their sympathies from Caroline, receiving her with enthusiasm. A charge of adultery was brought against her by the king before the house of lords, which, as partisan feelings were blended with the intrinsic interest of the case, created the greatest excitement in England. The house of lords, by a majority of 108 against 99, passed a bill of pains and penalties intended to apply to her case; but public opinion was so strongly in her favor that the prosecution was abandoned by the government. Brougham, who was her counsel, hinted significantly that if the charge was pressed the defence could prove the marriage of the king with Mrs.

Fitzherbert, which by the law would have excluded him from the throne. The queen remained in undisputed possession of her rank and title. She, however, was deeply affected at the result of the trial, and the moral shock received on this occasion accelerated her death. The humiliation of seeing the doors of Westminster abbey shut against her, when in July, 1821, she presented herself to attend the coronation of George IV., was the last blow dealt to her before she died. Her funeral gave rise to disturbances at London and Brunswick, the people attributing her death to her opponents.

CAROLINE ISLANDS, or *New Philippines*, an archipelago of Oceania, between the Philippines, the Ladrões, the Marshall islands, and Papua. They lie between lat. 3° and 12° N. and lon. 135° and 165° E.; area, 1,000 sq. m.; pop. about 28,000. They are divided into numerous groups. The westernmost of these, the Pelew, consists of seven large and a number of small islands, all of coralline formation. They are generally flat, and afford no secure anchorage. N. E. of these is the group of Yap, the principal island of which is mountainous and rich in precious metals. The islands of Egoi, resembling the Pelew in surface and formation, lie E. of Yap; they are fertile and partly inhabited. Other groups are the Swede islands, the Lütke, and the Seniavin islands. The easternmost island, called Ualan, is 24 m. in circumference, and has abundant supplies of water, fruit, and fish. The climate is mild and agreeable. The inhabitants, most of whom are of the Malay race, are generally fishermen, and make excellent sailors.—The Carolines were discovered in 1543 by Lopez de Villalobos, and were named in honor of Charles V. Nominally they belong to Spain and form part of the government of the Philippines, but they have no Spanish settlements.

CAROLINE MATILDA, queen of Denmark, daughter of Frederick Lewis, prince of Wales, and sister of George III. of England, born July 22, 1751, died at Celle, May 10, 1775. She married in 1766 Christian VII., king of Denmark, and in 1768 became mother of Frederick VI. She endeared herself to all around her, excepting the queen dowager, Sophia Magdalen, and Juliana Maria, the king's stepmother, who were jealous of her influence, and treated her with marked hostility. Their dislike to the young queen assumed a still more formidable character when Struensee, the physician and special favorite of the queen, rose to supreme power in Denmark, and in concert with his royal mistress acted with the liberal party, while the queen dowager and Juliana Maria were partisans of the old Danish aristocracy. At the same time grave imputations were cast by them upon the queen's honor. In 1771 she was delivered of a daughter; and her enemies, calling attention to the long illness and feebleness of the king, attributed the child to the illicit connection with Struensee. The ruin of the queen and her favorite was re-

solved upon by the queen dowager and her party, and on the night of Jan. 16, 1772, during a ball at the court, the agents of the queen dowager's party so wrought upon the fears of the weak Christian as to induce him to sign orders for the arrest of the queen, her favorite, and several of their partisans, and to appoint their most violent enemies to the principal offices of state. Struensee and the queen were immediately taken into custody. The minister and his friend Brandt were sentenced to death, and Caroline with her little daughter (the future duchess of Augustenburg), barely escaping the same fate, were consigned to Kronborg castle. But for Lord Keith, the British minister at Copenhagen, more stringent measures would have been taken against her; as it was, a separation from her husband King Christian (who by his semi-idiotic condition had long since ceased to possess any personal influence) was agreed upon, and Celle in Hanover assigned to her as a place of residence, where she died after a few years. A monument has been erected to her in Celle. Lenzen published a book on her last hours, containing the celebrated letter written by the queen to her brother George III., in which she asserts her innocence. See also *Die Verschwörung gegen die Königin Karolina Mathilde und die Grafen Struensee und Brandt, nach bisher ungedruckten Originalacten* (Leipsic, 1864).

CARON, or *Carron*, **Franciscus**, a Dutch navigator, perished by shipwreck off Lisbon in 1674. He was of a French Protestant family which had taken refuge in the Low Countries. He engaged when very young as assistant cook on board a vessel departing for Japan. During the voyage he applied his leisure to the study of arithmetic, and after his arrival in Japan learned the native language. This acquisition rendered him especially useful to the Dutch East India company, and he became director of their commerce with Japan, and a member of their council. Colbert was at this time striving to give to France some importance in the commerce of the East Indies, and sought among foreigners men capable of seconding his views. In 1666 Caron accepted letters patent appointing him director general of the French commerce in India, other Dutch and French merchants being joined with him with the same title. Caron arrived at Madagascar in 1667; but, finding the French offices at that island in hopeless confusion, it was decided not to remain there. He departed for Surat, and began operations there with good success. Several of his subsequent plans and operations proved unfortunate, and his imperious and avaricious character excited many enemies against him at court. The minister was constrained to recall him; and, that Caron might not suspect the hostile motive, it was pretended to him that his advice was needed with reference to new enterprises. He embarked for Marseilles, bringing with him a great amount of treasure; but after he had passed the straits

of Gibraltar, he was informed by a vessel which he met of the disposition entertained concerning him at court. He at once turned his ship about and directed his course to Lisbon. He had already anchored in this port, when a heavy sea beat his vessel against a rock, and it went to the bottom with its passengers and cargo, one of his sons alone being saved. He wrote a "Description of Japan," published in 1636.

CARON, René Édouard, a Canadian jurist and statesman, born in the parish of Ste. Anne Côte de Beaupré, Lower Canada, in 1800. He was educated at the seminary of Quebec and the college of St. Pierre, Rivière du Sud, and admitted to the bar in 1826. In 1827 he was elected mayor of Quebec, which office he filled till 1837. In 1841 he was appointed member of the legislative council for Lower Canada, of which body he was speaker from 1843 to 1847, and subsequently from 1848 to 1853. In 1841 he entered into a correspondence with Mr. Draper, then at the head of the government of Canada, with a view of bringing into the cabinet some French Canadians; but the project was not favored by the real chief of the French Canadians, Mr. Lafontaine, and failed. Caron became a member of the Lafontaine-Baldwin administration in 1848, and abandoned political life in 1853, becoming judge of the court of queen's bench, Lower Canada, in which the French civil and the English criminal law are administered. This post he temporarily vacated in 1857, on receiving the appointment of commissioner for codifying the laws of Lower Canada; and when this work was done he returned to his duties as judge. Being superannuated for this office, Mr. Caron entered on the duties of lieutenant governor of Quebec in February, 1873, in the 73d year of his age.

CAROOR, a town of British India, in the presidency of Madras, district of Coimbatore, on the Ambrawutty river, near its junction with the Caverry, 38 m. W. N. W. of Trichinopoly, with which it is connected by railway. It contains about 1,000 houses, has near it a fort and a large temple, and has been in the possession of the British since 1760.

CAROUGE, a town of Switzerland, on the left bank of the river Arve, in the canton and 1 m. S. of Geneva, with which it is united by a bridge; pop. about 5,000. It contains a fine Roman Catholic and a Protestant church and a synagogue. Cotton, leather, and earthenware are manufactured here. Victor Amadeus III. of Sardinia founded the town in 1780, as a rival to Geneva. For a short time it was a resort of political refugees and a centre of the smuggling trade with France; but it declined in importance after the occupation of Geneva by French troops in 1798. It ceased to be under Sardinian rule in 1816, and was assigned to Switzerland. One of the favorite roads from Geneva to the summit of the neighboring Mont Salère is by way of Carouge.

CAROVÉ, Friedrich Wilhelm, a German philosopher and publicist, born at Coblenz, June 20, 1789, died in Heidelberg, March 18, 1852. He was an advocate, held some judicial offices, was made doctor of philosophy by the university of Heidelberg, and officiated for a short time as professor at Breslau. He was one of the founders of the Heidelberg Burschenschaft, and participated in the famous Wartburg festival. He was afterward a member of the provisional German parliament of 1848. His most elaborate works are attacks on the Roman Catholic religion, and include *Ueber die alleinseligmachende Kirche* (2 vols., Frankfurt, 1826); *Was heisst römisch-katholische Kirche?* (2d ed., Altenburg, 1847); *Die Buchdrucker-kunst in ihrer weltgeschichtlichen Bedeutung* (Siegen, 1843); and *Ueber das sogenannte germanische und sogenannte christliche Staats-princip* (1843).

CARP, a malacopterygian fish, of the family cyprinidæ, genus *cyprinus*, having the body covered with large scales, a single elongated dorsal fin, fleshy lips, small mouth, with a barbel at the upper part of each corner in the common species, and a smaller one above; teeth in the pharynx, but none in the jaws; branchial rays three; the ventrals behind the



Cyprinus carpio.

pectorals, without any connection with the bones of the scapular arch; the second dorsal ray and the first anal serrated posteriorly; the tail forked; 12 rows of scales between the ventral and dorsal fins. The *C. carpio* (Linn.) is of a golden olive-brown color above, yellowish beneath, and the fins dark brown. It inhabits the fresh-water lakes and streams of central and southern Europe, whence it has been spread by man over the northern parts. It is noticed by Aristotle and Pliny, but was not held in much estimation in ancient times; it grows rapidly, lives to a considerable age, and is exceedingly prolific; it seems to have been introduced into England about 300 years ago. Carps prefer quiet waters, with soft or muddy bottoms, spawning in May or June, according to locality; the food consists of larvæ of aquatic insects, worms, and soft plants, though they eat almost any vegetable food in artificial ponds. They are very tenacious of life, and will pass long periods, especially in winter, without food; they afford but little sport to the angler, being very uncertain, and are difficult to take in nets. Their size varies from $\frac{1}{2}$ to $2\frac{1}{2}$ feet, and their weight from

1 to 18 lbs.; they are in season from October to April, and are generally considered excellent for the table. The common carp of Europe has been introduced from France into the Hudson and other waters of New York. The gold fish, or golden carp, is the *C. auratus* (Linn.). The crucian carp (*C. gibelio*, Bloch) is of smaller size, and is considered by some the same as the *C. carassius* (Bloch). In this country the name of carp is erroneously applied to some species of *catostomus* and *luxilus*, belonging to the same family of fishes.

CARPACCIO, Vittore, a Venetian painter, born probably in Istria, died subsequently to 1519. He was a pupil and follower of Giovanni and Gentile Bellini of Venice, and in several of his efforts even surpassed the latter master. His best works belong to the period immediately succeeding 1490, when he painted for the school of Sant' Ursula in Venice nine pictures illustrating scenes in the life of St. Ursula, which are now in the academy of Venice. Another fine work was a "Presentation of Christ in the Temple," painted for the church of San Giobbe. He was an industrious and successful painter till 1515, when, owing to age or debility, his powers began rapidly to decline. He was fertile in invention, a master of perspective, and earnestly impulsive in the conception and rendering of movement. Hence he preferred scenes of life and action, into which he could introduce ordinary objects and incidents, to purely religious subjects. He was an indifferent colorist. Such of his pictures as remain in Venice are more or less injured by damp and efforts to repair them. Fine specimens by him are in the galleries of Milan and Berlin and the Louvre.

CARPEA, among the ancient Greeks, a kind of mimetic dance peculiar to the Ænians and Magnetes, in Thessaly. It was performed by two armed men, one representing a ploughman and the other a robber, in the following manner: The laborer, laying aside his arms, begins to plough with a yoke of oxen, frequently looking around as if in alarm. When the robber at length appears, the ploughman snatches up his arms, and a fight begins for the oxen. The movements are rhythmical, and accompanied by the flute, and at last the victor takes away the oxen and plough for his reward.

CARPANI, Giuseppe, an Italian dramatist and writer on music, born at Villalbese, near Milan, Jan. 28, 1752, died in Vienna, Jan. 22, 1825. Educated for the law, he devoted himself to literary pursuits, and produced a great number of plays and operas, partly translations and partly original. In 1792 he was editor of the *Gazzetta di Milano*, and wrote violent articles against the French revolution. He was obliged to leave the city after the invasion of the French, and went to Vienna, where he was appointed censor and director of the theatre. In 1809 he accompanied the archduke John in the expedition against Napoleon.

Under the title of *Haydine*, he published a series of curious and interesting letters on the life and works of Haydn the composer. These letters, published in a French translation as an original work, under the name of L. A. C. Bombet, by Beyle (Stendhal), gave rise to a great literary controversy, in which Carpani successfully vindicated his authorship.

CARPATHIAN MOUNTAINS, a mountain system in central Europe, encircling Transleithan Austria on the N. W., N. E., and S., and separating it from Moravia, Austrian Silesia, Galicia, Bukowina, and Roumania. The entire range forms a semicircle about 800 m. long, commencing at New Orsova, on the Turkish frontier, where it is separated from the N. offshoots of the Balkan range only by the Danube, and terminating on the same river in the lofty rock on which the castle of Presburg is situated. Its breadth, including branches on both sides of the Hungarian and Transylvanian frontiers, varies from 100 to 200 m. The highest eminences rise 8,000 or 9,000 ft. above the sea level. The loftiest peaks were formerly thought to be in the Transylvanian section, but recent measurements show that the Gerlsdorf and Lomnitz peaks of the Tatra range, in the Hungarian section, have a greater altitude. The highest parts of the whole Carpathian system consist of granite. Sandstone and limestone are found at a lower level, and basalt, porphyry, jasper, petrosilex, lava, obsidian, and numerous other substances, the result of volcanic and aqueous action, are scattered among the lower ranges. No traces exist of recent volcanic eruption, though there is unquestionable evidence of the extensive agency of fire and water at some time. The Carpathians stand preëminent among the mountains of Europe in respect to mineral wealth. Nearly every metal is produced abundantly from their sides. There are rich mines of silver and gold at Kremnitz and at Schemnitz in Hungary, and a gold mine at Nagy Ag in Transylvania, which is esteemed one of the richest in Europe. Iron, copper, lead, and mercury are also found in large quantities, and rock salt lies in immense deposits throughout both sections of the chain. The Carpathians present four zones of vegetation, rising successively. There is first the woody region, where the oak, beech, and chestnut thrive, which reaches to a height of more than 4,000 ft. above the sea. Then the *pinus abies*, or Scotch fir, appears, and occupies a zone of 1,000 ft. This is succeeded by the moss pine, which diminishes in size as the elevation increases, and at the height of 6,000 ft. appears only as a small shrub and in scattered patches. The open places of this region produce a few blue-bells and other small flowers. From the termination of the moss pine to the summit the mountains have a barren and dreary look, their conical peaks being of naked rock, or covered only with lichens; yet even at these heights a straggling blue-bell or gentian may sometimes be found. None of the Carpathians

are covered with perpetual snow. Small mountain lakes of great depth, called "eyes of the sea," are met with in various parts. Numerous passes intersecting these mountains facilitate communication between the countries lying at their base. The most remarkable and frequented of these are those of Teregová, leading from Orsova to Temesvár; of Vulcan, forming the valley in which the Schyl flows; and of the Red Tower in a gorge formed by the Aluta, at the foot of Mt. Surul. All of these passes were formerly strongly fortified to prevent the entrance of the Turks into Transylvania, but several of them have nevertheless at various times been forced. (See HUNGARY, and TRANSYLVANIA.)

CARPATHUS. See SCARPANTO.

CARPEAUX, Jean Baptiste, a French sculptor, born in Valenciennes, May 14, 1827, died Oct. 23, 1875. He studied in Paris, obtained the prize of Rome in 1854, produced his first statue, a fisher boy, in 1859, and in 1863, in his group of Ugolino and his children, which was purchased by the government, attracted attention by a bold departure from classical models. Conspicuous among his subsequent productions are a Neapolitan fisherman, in Baron Rothschild's gallery; a girl with a shell, in possession of the duchess de Mouchy; and many busts. In 1865 he executed for the Flora pavilion of the Louvre statuary exhibiting imperial France as enlightening the world and protecting agriculture and science. His subsequent work representing dancing on the façade of the new opera house has been highly praised for its singular picturesqueness, and much censured for violating the conventional rules of art; and an unavailing attempt to damage it by corrosive ink was made soon after its appearance, in the night of Aug. 27, 1869.

CARPENTARIA, Gulf of, the largest bay of Australia, deeply indenting the northern coast, between lat. $10^{\circ} 40'$ and $17^{\circ} 30' S.$, and lon. 137° and $142^{\circ} E.$ No settlement has yet been made on its coast. The name is derived from Peter Carpenter, who from 1623 to 1627 was governor general of the Dutch possessions in the East Indies.

CARPENTER, Lant, LL. D., an English clergyman, born at Kidderminster, Sept. 2, 1780, died April 5, 1840. He was of a nonconformist family, and at an early age was adopted and educated by Mr. Pearsall, a relative of his mother. Designed for the ministry, he was sent in 1797 to the Northampton academy. That school being temporarily discontinued, he was placed at Glasgow college. Leaving college in 1801 without his degree, he spent some time in teaching, and as librarian of the Athenæum, Liverpool. While at the academy he became imbued with liberal religious views, and at Liverpool he allied himself with the Unitarian denomination, receiving several invitations to the pastoral charge of Unitarian congregations, and a call to a professorship in their college at York. In 1805 he finally accepted a call to

succeed Dr. Thomas Kenrick at Exeter, where he continued for 12 years. From Exeter he removed to the pastoral charge of the Unitarian congregation at Bristol (1817), where he continued with a short interval until his death, which occurred by falling overboard between Naples and Leghorn, while on a tour for his health. His piety was of an eminently practical turn. The instruction of children was an object of constant interest, and he established Sunday schools among the children of Exeter and Bristol. Among his more important works are "An Introduction to the Geography of the New Testament," "Unitarianism the Doctrine of the Gospel," "Examination of the Charges against Unitarianism," "Harmony of the Gospels," and a volume of sermons.

CARPENTER, William Benjamin, an English physiologist, son of the preceding, born in Exeter, Oct. 29, 1813. He was originally intended for an engineer, but graduated as doctor of medicine at Edinburgh in 1839. One of his earliest papers, published in the "Edinburgh Medical and Surgical Journal," was on the "Voluntary and Instinctive Actions of Living Beings;" and in this and other early papers he laid the foundations of those views which he afterward developed more fully in his "Principles of General and Comparative Physiology," intended as an Introduction to the Study of Human Physiology, and as a Guide to the Philosophical Pursuit of Natural History" (8vo, London, 1839). After receiving his diploma in Edinburgh, he settled in Bristol, and became lecturer on medical jurisprudence in the medical school of that city. In 1843 and subsequent years he produced the "Popular Cyclopædia of Science," embracing the subjects of mechanics, vegetable and animal physiology, and zoölogy. In 1844 he was appointed professor of physiology in the royal institution, London, where he has since resided. In 1846 he published "Principles of Human Physiology," which reached a 7th edition in 1869. In 1854 a 4th edition of his "Principles of Comparative Physiology" was published, followed by the "Principles of General Physiology." These two works, with that "On Human Physiology," form three independent volumes, comprising the whole range of biological science. The articles on the "Varieties of Mankind," the "Microscope," "Smell," "Taste," "Touch," "Sleep," "Life," "Nutrition," and "Secretion," published in the "Cyclopædia of Anatomy and Physiology," are also from his pen. Having written much as a popular disseminator, as well as an original investigator of science, he has been accused of being a plagiarist and mere compiler. In answer to this charge, he claims, in the preface to the 3d edition of his "General and Comparative Physiology," the following facts and doctrines as his own: 1. The mutual connection of vital forces, and their relation to the physical. This doctrine is fully developed in a paper on the "Mutual Rela-

tions of the Vital and Physical Forces," in the "Philosophical Transactions" for 1850. 2. The general doctrine that the truly vital operations of the animal as well as the vegetable organism are performed by the agency of untransformed cells, which was first developed in an "Essay on the Origin and Functions of Cells," published in the "British and Foreign Medical Review" for 1843. 3. The organic structure of the shells of mollusca, echinodermata, and crustacea, of which a full account is contained in the "Reports of the British Association" for 1844 and 1847. 4. The application of Von Baer's law of development from the general to the special to the interpretation of the succession of organic forms presented in geological time. 5. The relation between the two methods of reproduction, that by gemmation and that by sexual union, with the application of this doctrine to the phenomena of the so-called "alternations of generations;" first developed in the "British and Foreign Medico-Chirurgical Review" for 1848 and 1849. 6. The relation between the different methods of sexual reproduction in plants; first developed in the same periodical for 1849. 7. The application of the doctrine of reflex action to the nervous system of invertebrata, especially articulated animals; first developed in the author's prize thesis, published in 1839. 8. The functional relations of the sensory ganglia to the spinal cord on the one hand, and to the cerebral hemispheres on the other.—In 1856 Dr. Carpenter published a work "On the Microscope, its Revelations and its Uses," in which he displayed the same industry, accuracy, and impartiality as in his other writings. He has also published several interesting papers on the fossil forms of the family of *foraminifera*, and "An Introduction to the Study of the Foraminifera." He has been professor of medical jurisprudence in University college, London; lecturer on general anatomy and physiology at the London hospital and school of medicine; and registrar to the university of London. In 1849 he gained the prize of 100 guineas offered for the best essay on the subject of "Alcoholic Liquors." This essay was published in 1850, and acquired great popularity among the advocates of total abstinence. He was editor for many years of the "British and Foreign Medico-Chirurgical Review," and while thus occupied with writing he was also much engaged in lecturing. In 1872 he was president of the British association for the advancement of science.—Dr. Carpenter's more recent labors have been directed to the subject of submarine animal life, and the temperature and constitution of the oceanic waters at various depths, as indicated by the result of deep-sea dredgings. In 1868 he made an expedition, in a government vessel fitted for this purpose, to the waters between the north of Scotland and the Faroe islands; in 1869 an expedition to the Atlantic ocean south and west of Ireland, and a second to the neighborhood of the Faroe

islands; and he has since given a report of similar investigations in the waters of the Atlantic between Great Britain and Portugal, and in those of the Mediterranean. The results of these observations show that submarine animal life does not, as was formerly supposed, diminish rapidly at the depth of 100 fathoms, and nearly disappear at 300, but that it is abundant at much greater depths; living mollusks, crustaceans, and protozoa having been brought up by dredging from depths varying from 450 to 2,435 fathoms. He also found that in the North Atlantic, between the Hebrides and the Faroe islands, at from 400 to 550 fathoms' depth, there are warm and cold areas, the former having a minimum temperature of from 46° to 49° F., the latter from 32° to 33½°; while the surface temperature is nearly the same in both, namely, from 50° to 52°. The deep waters of the Mediterranean, on the other hand, were found to have nearly a uniform temperature throughout, namely, between 54° and 56½° F. The saltness and density of the waters of the Mediterranean, also, were found to be greatest near the bottom, while in the Atlantic they are greatest at or near the surface.

CARPENTRAS (anc. *Carpentoracte*), a city of France, in the department of Vaucluse, on the left bank of the Auzon, at the foot of Mont Ventoux, 15 m. N. E. of Avignon; pop. in 1866, 10,848. It is surrounded by high walls and beautiful walks, has a large Gothic cathedral with a spire of the age of Charlemagne, a departmental college, and a public library with 28,000 volumes and many valuable manuscripts. Under the Romans *Carpentoracte* was an important town of Gallia Narbonensis. Under Pope Clement V. in 1313 it was the seat of the holy see, to which with Avignon it belonged till 1791. From the 3d century till 1801 it was the seat of a bishopric.

CARPET, a sort of thick cloth, used principally for covering the floors of apartments. In its place, at a very early period, straw, rushes, and other coarse materials were used. Improving upon this, the rushes were plaited into matting, which, though homely enough in appearance, served to promote warmth and comfort. In England, where wool was obtained in abundance, a kind of coarse woollen cloth was often seen upon the floors of the gentry. As late as the time of Queen Mary rushes were strewn on the floor of her presence chamber, though carpets had long before been introduced from the East. In Egypt their manufacture is traced back to a very remote period; and in Persia and other Asiatic countries the art, practised by the hand, had attained a high degree of excellence long before it was known in Europe. Purple carpets of great beauty were used at the banquets of the ancient Greeks, spread beneath their couches. The Babylonians, still earlier, ornamented their fabrics with figures of men and strange devices of fabulous creatures. These were

imported by the Greeks and Romans; and from what we know of the fabric, it appears to have been rather of the nature of tapestry than of what we now call carpets—made by introducing tufts of woollen yarn into a warp stretched in a frame, which are held down by a woof passed over each tuft. Such is the method of carpet weaving now practised by the Asiatics, the stitches being made one by one by the slow and tedious operation of the fingers. Young girls acquire great skill in this work, and their hands and eyes are soon trained to do it with ease and rapidity; but by one of the modern machines 1,000 stitches are sooner made than one by the hand process. In Persia whole families, and even tribes, are employed in carpet weaving. These carpets are, however, of so small a size that they are little used. They are purchased by travelling merchants, who dispose of them to Europeans in Smyrna and Constantinople. These carpets are also woven by families, and no large manufactory for them exists. They are in one piece; the patterns are peculiar, and no two are ever made exactly alike. Their chief beauty consists in the harmonious blending of the colors, and in the softness of their texture, rendering them agreeable both to the eye and to the foot. In the process of manufacturing the weaver sits in front of the loom, and fastens to each thread of the warp a bunch of colored yarn, varying the color according to the pattern. The row being completed, he passes a linen weft through the web, and drives it well up, so that all the bunches may be securely fastened. In this way narrow breadths of carpet are made, which are afterward laid side by side and united, so as to form one large piece. The tufts are then pared of equal length, and being beaten down, the whole presents a smooth, even surface. Rugs are made in the same manner. In British India the manufacture of carpets is carried on to a great extent. In Benares and Moorshedabad costly carpets of velvet with gold embroidery are made. Silk-embroidered carpets are manufactured in various places; the woollen ones principally at Masulipatam.—For many years Europe received all her supplies of carpets from the East. The manufacture is said to have been introduced into Europe by the French in the reign of Henry IV. The manufactory now belonging to the French government, and still producing excellent fabrics, was established at Beauvais in 1664 by Colbert, minister of Louis XIV. Another large factory was at Chailot, a league from Paris, where the carpets were worked in the manner of the modern Wilton carpet. The first successful operations in England were at Mortlake, in Surrey, to which enterprise James I. contributed £2,676. In the middle of the 18th century the business was much extended in different localities, and in 1757 a premium was awarded by the society of arts to Mr. Moore for the best imitation Turkey carpets. This kind of carpet was afterward largely

produced at Axminster, in Devonshire, made even more expensive than the real Turkey by the substitution of worsted for woollen yarn; but the manufacture ceased here, and in Yorkshire also, many years ago. The other varieties of carpets in use, as the Kidderminster or two-ply, called in this country the ingrain, the three-ply, the Venetian, Brussels, and Wilton, are all made by machinery. The ingrain, made with two sets of worsted warp and two of woollen weft, consists of two distinct webs incorporated into each other at one operation, the warp threads passing from one to the other to bring the required colors to the surface. Each web, however, is a cloth of itself, which, if separated by cutting it from the other, would present a coarse surface like baize. Two colors only are used to best advantage in this kind of carpet, the introduction of more tending to give a striped appearance. The three-ply is also ingrained, the threads being interlaced to produce three webs, thus making a fabric of greater thickness and durability, with the advantage of greater variety of color. The pattern, however, does not appear in opposite colors on the two sides in this, as it does in the two-ply. Great difficulty was experienced in applying the power loom to weaving this fabric; in Europe the idea was wholly abandoned; and in 1839 two-ply ingrain were woven at Lowell, Mass., only by the hand loom, at the rate of eight yards a day. At this time Mr. E. B. Bigelow of Boston improved the power loom so that he obtained with it from 10 to 12 yards a day, and afterward by still further improvements so perfected the machinery that the power loom is now wholly used, and with such economy of labor as to have greatly reduced the cost of carpets, and extended their manufacture to meet the increased demand. The inventions of Mr. Bigelow have been so important in this branch of manufacture as to have given it an entirely new character; and though their full description would be too technical and detailed, a general account of those immediately connected with this subject may properly be introduced. The object sought for was a loom which should make carpet fast enough to be economical, one which should make the figures match, and produce a good regular selvaige, and a smooth, even face. The hand weaver can at any moment tighten the weft thread, if too loose after the shuttle has been thrown, and so make the selvaige regular; if he finds by measurement that, by reason of the irregularity of the weft threads or the ingraining, the figure is being produced too long or too short, he gives more or less force to the lathe in beating up; and if he finds that the surface of the cloth is getting rough, he regulates the tension of the warps. In this way, by observation and the exercise of skill and judgment, he can approximate, and only approximate, to the production of a good and regular fabric. In the first loom Mr. Bigelow

produced, he approximated more nearly than the hand weaver to a perfect match in the figure; and this he effected by taking up the woven cloth by a regular and positive motion which was unerring, the same amount for every throw of the shuttle and beat of the lathe. As the weft threads are not spun regularly, and the weaving in of the warp threads and passing the different colors from the upper to the lower ply or cloth to produce the figures require sometimes more and sometimes less to make a given length, he determined to regulate the delivery of the warps as required by their tension, thereby throwing the irregularities into the thickness, where they cannot be noticed, instead of into the length, where they would destroy the match of the figures. He accomplished this by suspending a roller on the woven cloth, between the lathe and the rollers that take up this cloth, so that when the cloth was being woven too short, which indicates a deficient supply of warps, the roller would be elevated, and by its connection increase the delivery motion to give out more warps, and *vice versa*. Still this served only to prevent the further extension of a fault already incurred. The roller, to perfectly accomplish its purpose, should have been applied to the unwoven warps, which seemed then impracticable; for when the lathe beats up the weft, these must be rigid to resist the beat, and no way was apparent to make the roller sensitive to detect and indicate the amount taken up. The warps, moreover, are necessarily all rolled up on the warp beam with equal tension, and so can only be given out equally. The improvement was afterward perfected by Mr. Bigelow in the following manner: Each warp thread in the usual way passes through a loop called a mail, attached to a card suspended from the jacquard, and each card has suspended to it a weight, all the weights being equal. The two trap boards of the jacquard move simultaneously, one up and the other down, and in these movements they catch or trap such of the cards (determined by the combination of cards) as are required to bring up the proper warp threads at each operation to produce the figure, leaving down such of them as are not required at that particular operation; and when the two trap boards are on a level, and all the warp threads connected with them are in a horizontal line, and those not connected with them hang down with the suspended weights, the lathe beats up the weft thread, which lies between the warps that are in a horizontal line, at the same time exerting a force on the weft threads previously thrown, and beating them up more closely. Now, as the warp threads are all connected at one end with woven cloth, and at the other with the beam, it follows that those which are hanging down in a bent line will receive a greater proportion of the force of the beat of the lathe than the others; and as all the warp threads in succession take this position, and all have an equal weight, it follows that each suc-

cessively receives the same pull at the time the lathe beats up; thus the tendency to irregularity of surface from the varying lengths of warp threads taken up in ingraining is counteracted. The selvage was made smooth and even by a contrivance which regularly gave a pull to the weft thread after the shuttle was thrown. Mr. Bigelow at last, by these improvements and others which he introduced, brought the loom to average from 25 to 27 yards a day of two-ply, and from 17 to 18 yards of three-ply carpet. His improved method of producing figures that will match was afterward introduced, and patented in 1845. The same machinery was found to be applicable to the manufacture of Brussels and tapestry carpets, the weaving of which otherwise than by hand was before generally considered a mechanical impossibility. With the hand loom they were made at the rate of three or four yards per day; but with the improved loom the production was increased to 18 or 20 yards per day. The carpets, too, were made more exact in their figures, so that these perfectly matched, and their surface was smooth and regular. They surpassed, indeed, in their quality the best carpets of the kind manufactured in any other part of the world. The looms of Mr. Bigelow were introduced into factories built at Lowell, Mass., and Thompsonville and Tariffville, Conn., for their use, and others were established at Clinton, in Worcester co., Mass., where carpets are now made to the annual value of about \$1,000,000.—Brussels carpet is so named from Brussels in Belgium, whence the style was introduced into England in the last century. It is made upon a ground of linen weft, which is concealed by the worsted threads that are interlaced with and cover it. The threads are commonly of five different colors. In the weaving these run the length of the web, and are so managed that all those required by the pattern are brought up together across the line of the carpet; before they are let down, a wooden instrument called a sword is passed through to hold up the threads; this is replaced by a round wire, which, being at last removed, leaves a row of loops across the carpet. In a yard length the number of successive lifts of the sets of colors required is sometimes as many as 320, each of which forms a row of loops. Four colors must always lie beneath the fifth, which appears on the surface, and thus the carpet, with its linen weft too, is thick and heavy. The Wilton carpet, the *moquette* of the French, differs from the Brussels in the loops being cut before the wire is removed, a groove in the flat upper surface of the wire admitting of their being cut by passing a knife along the surface. The soft ends give the carpet a rich velvety appearance. In the imperial Brussels carpet the figure is raised above the ground of the pattern, and the loops of this are cut, but not those of the ground. Various methods have been devised of simplifying the processes of making Brussels carpet. Richard Whytock of Edin-

burgh introduced an ingenious plan of using threads dyed of the colors in the succession they would be required; this was done before they were made into the warp, and by a systematic arrangement, and thus a considerable proportion of the threads was dispensed with. His looms produce what are known as "patent tapestry and velvet pile" carpets. Another device is to weave the carpet in plain colors, and then print it with rollers or with blocks, after the method of calico printing. On account of the thickness of the fabric, difficulty is experienced in introducing sufficient color without going over the work many times. In doing this, the difficulty is of course increased of retaining each color within its own exact limits. Rollers were first used; but a cheap kind of carpet is now produced at Manchester, England, by block printing. Felt carpets are also printed in colors in this country.—Venetian carpets (which, by the way, were never a production of Venice) are made with a heavy body of worsted warp, which completely hides the woof; this should be an alternate shoot of worsted and linen yarn. The fabric admits of little variety of design. It is made in narrow widths for stairways and passages.—The patent wool mosaic carpet is a novel manufacture carried on by Messrs. John Crossley and Sons, of Halifax, England. A strong, plain cloth is used as a ground; upon this a pile of warp threads, first arranged over and under parallel strips of metal, which are cut out, leaving the ends like those of a Wilton carpet, is placed and cemented with caoutchouc. If the threads were of different colors, stripes are produced, or the yarns may have been colored by Whytock's plan, or colored patterns may be obtained by another process in use. This method is principally applied to the production of small articles.—Great Britain is the principal seat of the carpet manufacture of the world. The following table shows the exports of carpets from Great Britain to other countries in 1871; and from this it will be observed that, notwithstanding there are several million yards of carpets made yearly in the United States—one company, at Lowell, Mass., producing 37,000 yards per week—more than 65 per cent. of the exports of British carpets come to this country:

COUNTRIES.	Yards.	lbs.	Value.
Russia.....	198,075	846,658	£184,900
Germany.....	821,919	550,593	260,945
Holland.....	247,880	413,280	201,435
Belgium.....	161,095	273,260	116,220
France.....	330,434	607,750	250,325
Spain.....	313,566	428,880	156,440
Italy.....	286,587	471,837	219,345
Turkey.....	179,284	271,406	107,075
Egypt.....	61,925	101,689	52,260
Peru.....	93,581	151,763	71,770
Chili.....	163,548	275,742	128,905
Argentine Republic.....	104,034	162,360	78,270
Australia.....	393,405	511,125	237,275
Br. N. America.....	772,960	1,020,783	459,270
United States.....	6,882,456	11,469,178	5,433,190
Other Countries.....	446,784	726,002	384,530
Total.....	10,957,453	17,781,806	£8,242,055

CARPET BEETLE. See supplement.

CARPI. **I.** A town of Italy, in the province and 9 m. N. N. W. of Modena, on the canal of Secchia; pop. about 5,000. It has a citadel, walls, a cathedral, and a seminary, and is the seat of a bishop. Silk culture and the manufacture of straw hats are the chief branches of industry. It was the principal town of the principality of Pico till 1530, when it was acquired by Modena. **II.** A fortified town of Italy, in the province and 23 m. S. E. of Verona, on the Adige; pop. about 1,200. In 1701, during the war of the Spanish succession, the French were defeated here by Prince Eugene.

CARPI, Ugo da, an Italian painter and engraver, born in Rome about 1486, died in the second quarter of the 16th century. He is chiefly known as the inventor of a species of engraving on wood, which consists in the use of separate blocks for the dark shadows, the light shadows, and the demi-tints. His prints are slightly executed, but spirited. They are mostly from the works of Raphael and Parmigiano. Bartsch in his "Peintre-Graveur" describes 15 prints attributed to Carpi.

CARPINI, Giovanni di Piano, an Italian Franciscan monk and traveller, born about 1220. In 1246 he was sent with a company of several other Franciscans on a mission to the great khan of Tartary, to convert him to Christianity if possible, or at least to induce him rather to employ his arms against the Saracens and Turks than against the Christians. Carpini travelled through Russia and along the shores of the Black sea, and finally reached the court of the Tartar monarch, in the region N. E. of the Caspian. He remained here a month or more, without apparently accomplishing much, and then set out on his return, which he effected safely, though not without much suffering. He wrote an account of his journey in Latin, an abstract of which was published in the "Voyages and Discoveries" of Hakluyt. He devoted the remainder of his life to preaching the gospel in Hungary, Bohemia, Norway, and Denmark, and died at an advanced age.

CARPINO, a town of S. Italy, in the province of Capitanata, situated on Mt. Gargano, near Lake Varano, 22 m. N. E. of St. Severo; pop. about 6,000, including the whole commune. It contains several churches, and is situated in a region celebrated for picturesque scenery.

CARPOCRATES, or Carpoeras, an Alexandrian theologian, of the Gnostic school, flourished under the reign of Hadrian in the 2d century. The fundamental Gnostic idea of a Supreme Being entirely disconnected with the affairs of the universe was the starting point of Carpoocrates. The demiurge, and the other finite spirits ruling over the material universe, were striving to keep humanity from unity with the supreme monad, to which it was constantly tending on account of its having been an original emanation from him. The preëxistent state of the human soul was that period when it had been in perfect unity with the supreme monad.

The demiurge and ruling spirits have drawn it away from this union. One of their methods of accomplishing it is by laws or religious duties and observances, such as self-denial and control of appetites and passions, and general humiliation and penances. This Gnostic antinomianism developed itself into a practical life of freedom from moral restraint, which Carpocrates and his son Epiphanes took all pains to justify. The gratification of the appetites and passions became a duty, and salvation by Jesus was only attainable on the condition of perfect abandonment to an antinomian life. Jesus was simply a man of superior soul, who had the power to discern the real difficulty, and strength to achieve his own practical redemption and point the way for others. Carpocrates and his followers rejected the gospels of Matthew and Luke, and the entire Old Testament, as the contrivance of the demiurge to keep men in subjection. They also denied the resurrection of the body.

CARPZOV, a family of learned Germans, said to be descended from a Spanish family named Carpezano, who were driven from their country by religious persecution at the beginning of the 16th century. The founder of the German family was SIMON CARPZOV, burgomaster of Brandenburg about 1550. His son JOACHIM reached a high rank in the Danish army, and died in 1628; and another son, BENEDICT (1565-1624), was professor of jurisprudence at Wittenberg, chancellor of the dowager electress Sophie, and again professor. Benedict left five sons, one of whom, also named BENEDICT (1595-1666), acquired eminence as a jurist in Leipsic and Dresden, and his *Practica nova Rerum Criminalium* (Wittenberg, 1635; new ed. by Böhm, 5 vols., Frankfurt-on-the-Main, 1758) and other works exerted great influence on the judiciary in Saxony and other countries. His four brothers were likewise men of great erudition and piety, especially JOHANN BENEDICT (1607-'57), who was professor of theology and preacher at Leipsic, and the author of *Systema Theologiæ* (2 vols., Leipsic, 1653) and other works. The latter had a son also named JOHANN BENEDICT (1639-'99), a clergyman, who published *De Pontificum Hebræorum Vestitu* and other critical works. Prominent among the brothers of the preceding were FRIEDRICH BENEDICT (1649-'99), collaborator in Mencken's *Acta Eruclitorum*, and SAMUEL BENEDICT (1647-1707), professor of poetry and chief chaplain of the court of Saxony. One of the latter's sons, JOHANN GOTTLÖB (1679-1767), was in the front rank of the theologians of his day. He was professor of oriental languages at Leipsic (1719-'30), and superintendent at Lübeck (1730-'67); and his works include *Introductio in Libros Canonicos Bibliorum Veteris Testamenti Omnes* (Leipsic, 1721), and *Critica Sacra Veteris Testamenti* (1728). Among the later members of the family was JOHANN BENEDICT (1720-1803), who was successively professor of philosophy at Leipsic and of poetry and Greek philology at

Helmstedt, and ended his life as an abbot after having taught theology. He occupied himself with philological labors, especially with grammatical commentaries on the New Testament.

CARR, Dabney, a member of the house of burgesses of Virginia, born in 1744, died at Charlottesville, May 16, 1773. He moved and eloquently supported a resolution to appoint a committee of grievances and correspondence, in consequence of British encroachments, which was adopted, March 3, 1773. He married a sister of Jefferson, by whom he is described as a man of eloquence, judgment, and inflexible purpose, mingled with amiability.

CARR, Sir Robert, British commissioner in New England, died at Bristol, June 1, 1667. He was appointed to that office by Charles II. in 1664, in conjunction with Nicolls, Cartwright, and Maverick. In 1664 Nicolls and Carr captured New Amsterdam from the Dutch, and called it New York, in honor of the king's brother, the duke of York, afterward James II. Carr forced the Swedes and Dutch on the Delaware into a capitulation. He returned to Boston in 1665, and in conjunction with his coadjutors assumed the government.

CARRACCI. I. Ludovico, the founder of the Bolognese school of painting, born in Bologna in 1555, died there in 1619. His first master, Prospero Fontana, a Bolognese painter, so little appreciated his capacity that he advised him to adopt some other profession. His slowness of execution was so remarkable that his fellow pupils called him in ridicule the ox. From Bologna he went to Venice, and studied with Tintoretto. Subsequently he visited Florence and Parma, where he gave much attention to the works of Andrea del Sarto, Correggio, and Parmigiano. The object of these varied studies was presently developed in the establishment of his school of painting, known as the eclectic school of Bologna. In this project he secured the assistance of his cousins Agostino and Annibale, who joined him in Bologna about 1585. In a few years their school was overflowing with pupils, and all the others in Bologna closed. As the head of the academy, Ludovico resided chiefly at Bologna; and his merit is more that of a teacher than of a productive artist. He has left many works at Bologna, including his fresco paintings in the palazzi Magnani and Zampieri; his series of scenes from the history of St. Benedict and St. Cecilia, in the convent of St. Michael at Bosco; an "Assumption of the Blessed Virgin," one of his best works; and the "Birth of St. John the Baptist." He also painted many "Ecce Homos" and "Pietàs." **II. Agostino**, cousin of the preceding, born at Bologna in 1558, died in 1601. He was the son of a tailor, was instructed in the goldsmith's art, and afterward became an engraver. At the invitation of Ludovico he embarked in his project for founding a new school of art in Bologna, but first went through a course of studies at Bologna, Rome, Parma, and Venice. To Agostino were assigned the

most important and laborious duties. He prepared treatises on architecture and perspective, lectured on anatomy, and suggested subjects for composition, drawn from history or fiction. He also proposed and awarded prizes for designs, celebrating the victor's triumph with music and song. His early predilection for engraving never forsook him, and, although his designs were numerous, he finished fewer paintings than either of the other Carracci. Among the best specimens of his paintings are "St. Jerome receiving the Sacrament before Death," at Bologna, and the "Infant Hercules strangling the Serpents," in the Louvre. **III. Annibale**, brother of the preceding, born in Bologna in 1560, died in Rome in 1609. He was at first a tailor, but was instructed in painting by Ludovico, and afterward sent to Parma and Venice, where he devoted years to the works of Correggio and the great Venetian colorists. His style was founded on the eclectic principle adopted by Ludovico. He was an industrious painter, and the works of this period of his life are numerous. His contributions to the palazzi Magnani and Zampieri in Bologna, in which he assisted Ludovico, were highly esteemed. In 1600, by the invitation of Cardinal Farnese, he visited Rome, where, under the influence of Raphael and Michel Angelo, his style developed itself in a new form. He was employed to paint for various churches in Rome, but his chief work is the series of frescoes of mythological designs in the Farnese palace, and particularly in the gallery, which occupied him eight years. At the commencement of this work he was assisted by Agostino; but the intercourse between the brothers, when they were not under the influence of Ludovico, was always liable to be interrupted by jealousies and disputes, and Annibale was soon left to labor alone. When the work was at length completed, the artist received only 500 crowns. Irritated by this parsimony, and enfeebled in health by long confinement, he repaired to Naples. The persecutions of the Neapolitan artists obliged him to return to Rome, where he died soon afterward. Besides the contributions to the Farnese palace, which have been frequently engraved, "St. Roch distributing Alms," in the Dresden Gallery, a "Dead Christ supported by the Madonna," the "Resurrection," at Bologna, and the "Three Marys" in the collection at Castle Howard, are among his most celebrated works. He was one of the first to practise landscape painting as a separate department of art. **IV. Francesco**, brother of the preceding, born at Bologna in 1595, died in Rome in 1622. He studied painting with Ludovico, and attempted to establish a rival school in Bologna, over the door of which he caused to be inscribed "This is the true school of the Carracci." The project failed.

CARRANZA, Bartolomé de, a Spanish prelate, born at Miranda in 1503, died in Rome, May 2, 1576. He early gained distinction as professor of theology at Valladolid, and attended

in 1546 the council of Trent as envoy of Charles V. He was subsequently tutor of Charles's son, afterward Philip II., whom he accompanied to Winchester in 1554, on his marriage to Mary of England, whose confessor he became, zealously coöperating with her in the interests of the church of Rome. Shortly after his accession to the throne Philip II. appointed him primate of Spain. In 1558 he was arrested by order of the inquisition on account of his *Comentarios sobre el catechismo cristiano*, though the catechism was approved by the council of Trent. His alleged heterodox influence upon Charles V. at his deathbed also gave offence. In 1567 his condition as a prisoner was ameliorated by his being removed to the castle of San Angelo in Rome; but he was not released till 1576, and died a few weeks afterward. His principal work, *Summa Conciliorum* (Venice, 1546), passed through many editions.

CARRARA, a city of Italy, in the province of Massa-Carrara, on the Avenza, 59 m. S. W. of Modena; pop. about 7,000. Its principal edifices are the college, the palace of the former dukes of Modena, the collegiate church, and the church of Madonna delle Grazie. An academy of sculpture was founded here by Napoleon, and many artists from abroad reside here to superintend the transport of marble, or to execute works of art. The inhabitants are chiefly engaged in the preparation of marble, which is obtained in the vicinity.

CARRARA MARBLE, a beautiful white marble, of fine granular texture, deriving its name from the city of Carrara. The Parian differs from it in being composed of the most delicate little plates or scales, confusedly united together. The magnificent chain of mountains in which the quarries of Carrara marble are situated forms a portion of the Apennines, and is included in the province of Massa-Carrara. These mountains are distant about 4 m. from the seashore, and present a very imposing appearance, towering to the skies, and broken into rugged and inaccessible peaks. The quarries, among which are those that furnished the material for the Pantheon at Rome, are about half way up the mountain; and although they have been worked for many centuries, and the annual export has long amounted to about 40,000 tons, yet the workmen are still employed upon the surface, so that the supply may be regarded as inexhaustible. The Carrara marbles are of four varieties. That used by sculptors, the white, granularly foliated limestone, is the most valuable. It is more easy to work than the compact limestone, its color is purer, and it is delicately transparent. The other varieties are the veined marble, with colored lines, which render it unfit for statuary; the *ravacioni*, or Sicilian, and the *baidiglio*, of a deep blue color. In working the quarries, large blocks of marble, some of more than 200 cubic feet, are loosened by blasting. When thoroughly detached, they are tumbled down or lowered

to the base of the mountain, whence they are transported to Marino, the port of shipment. This marble range extends over many square leagues. The whole number of quarries is estimated at about 400, of which 40 or 50 are constantly worked, employing about 1,200 men. Those of the statuary marble do not exceed 12 in all, but are the most productive as well as the most valuable. They are the property of a few of the principal families of Carrara. The Carrara marble, which was formerly regarded as a primitive limestone, proved to be an altered limestone of the oolitic period. The causes by which the change of its structure was effected have also served to obliterate all traces of the fossils which are usually found in the rocks of this period. An analysis of the best quality of this marble by Käppel gives :

Carbonate of lime.....	98.7654
Carbonate of magnesia.....	0.9002
Oxides of iron and manganese, and alumina.....	0.0825
Silica, trace of phosphoric acid, and loss.....	0.0961
Quartz sand.....	0.1553

100.0000

CARRAGEEN, or **Irish Moss**, a marine plant (*Chondrus crispus*), which grows upon the rocks of the coasts of Europe, particularly of Ireland, and is said to be a native of the United States. It is collected for the preparation of a light and nutritious food for invalids, and is particularly recommended in pulmonary and scrofulous affections, dysentery, diarrhœa, &c. It is prepared by macerating it in cold water, in which it swells without dissolving, and which removes the taste of extraneous matters mixed with it. It is then boiled in water, of which three pints are used to the ounce of moss. Milk instead of water makes a more nutritious preparation. It dissolves and gelatinizes, and the jelly is flavored with lemon juice, and sweetened with sugar. (See *ALGÆ*.)

CARRÉ, Michel, a French dramatist, born in 1819, died at Argenteuil, near Paris, June 29, 1872. He studied at the collège Charlemagne, and published in 1841 a volume of poetry, and in 1843 his first drama, *La jeunesse de Luther*. Subsequently he wrote for the stage together with Jules Barbier and others. Among their joint productions are the librettos of *Les noces de Figaro* (1858), *Le pardon de Ploërmel* (1859), *La reine de Saba* and *Lalla Rouck* (1862), and *Mignon* (1866).

CARREL, Nicolas Armand, a French journalist, born at Rouen, May 8, 1800, died at St. Mandé, near Paris, July 24, 1836. The son of a merchant, he was educated at St. Cyr, and entered the army as sub-lieutenant. He secretly participated in the Belfort conspiracy in 1821, but eluded suspicion. His political opinions became known on the occasion of the outbreak of the Spanish revolution. A letter he had written to the cortes came into the hands of his colonel, when he resigned his commission, and entered the foreign legion in Spain. When the French army invaded the peninsula, Carrel was made prisoner, and was three times tried

before a court martial, but escaped punishment. He was then engaged for a few months as an amanuensis to the historian Augustin Thierry; subsequently he wrote two essays on the history of Scotland and of modern Greece, and a biographical notice of Paul Louis Courier, the French pamphleteer; he was also editor of the *Revue Américaine*, a short-lived monthly, and an occasional contributor to several leading opposition papers, such as the *Constitutionnel* and the *Globe*. But he did not gain much literary reputation until the appearance of his *Histoire de la contre-révolution en Angleterre*. At the commencement of 1830, with Thiers and Mignet, he founded the *National* as an organ of their political views. Thiers, being the oldest and best known of the three, was the leading editor, while Carrel wrote chiefly for the literary department of the paper. The *National* had much influence in bringing about the revolution of 1830. When it was accomplished, Carrel was sent on a mission into the western departments, where his wise measures and personal influence contributed to maintain tranquillity. During his absence he had been nominated prefect of the department of Cantal; he declined the appointment, and went back to the *National*, of which he now assumed the chief editorship. Under his control, and chiefly by his contributions, the *National* became a most vigorous and eloquent journal, and gave to the republican party a standing which it never had before. The boldness of his course drew on him the anger of the government, but the measures taken against him could not damp his ardor. He was the first to vindicate the memory of Marshal Ney before the court of peers; and his temerity would have been severely punished if he had not been supported by Gen. Excelsmans. His quickness of temper involved him in several duels. His last encounter was with Émile de Girardin, who had challenged him. Girardin was slightly wounded in the thigh, and Carrel received a ball in the abdomen. He was taken to the house of one of his friends at St. Mandé, and died two days after. His collected works have been published (5 vols., Paris, 1858).

CARRENO DE MIRANDA, Juan, a Spanish painter, born in 1614, died in 1685. As a colorist, the Spaniards rank him with Titian and Vandyke. His principal paintings are a "Magdalen in the Desert," at Madrid; a "Holy Family," at Toledo; and a "Baptism of our Saviour," at Alcalá de Henares.

CARRERA, Rafael, president of Guatemala, born in the city of Guatemala in 1814, of mixed Indian and negro blood, died April 14, 1865. In 1829, when Morazan was president of the federal government, Carrera became a drummer boy. Subsequently he retired to the village of Metaquascuintla, where he married a woman of singularly energetic character, his constant companion throughout his subsequent career. In 1837 he placed himself at the head

of a band of insurgent mountaineers, and in February, 1838, occupied the city of Guatemala with 6,000 Indians, whom he succeeded in restraining from pillage and massacre. Some accommodation among the conflicting parties now followed, and Carrera was sent to Meta, a neighboring district of the interior, in an official capacity. On April 13, 1839, he again occupied the capital, which he subsequently held. Ruling at first as general-in-chief, he was elected, March 21, 1847, to the presidency of Guatemala. Early in 1851, with only 1,500 men, he defeated the combined forces of San Salvador and Honduras. He was reelected Oct. 19, 1851, as president for life. In 1861 he intervened with success in the contest which had arisen between the ecclesiastical authorities in Honduras and President Guardiola. In 1862 he opposed the plan for a confederation of the Central American republics, and the project failed. In 1863 he declared war against San Salvador, took possession of the capital, and expelled President Barrios. In the early part of his career he was regarded as the enemy of order and civilization, but he subsequently proved a mild and conservative ruler. His government was absolute. When first elected to the presidency he was unable to read or write, but he afterward in some measure repaired the deficiencies of his education.

CARRETTO, Francesco Saverio, marquis of, a Neapolitan minister of police, born in Salerno about 1788, died in Naples in December, 1862.

He fought his way to distinction in the army, and, although a member of the carbonari, was in 1823 appointed general inspector of police. In 1828 he marched at the head of 6,000 men to quell an insurrection at the little town of Bosco. After destroying the town he caused a pillory to be erected upon its ruins, and had 20 persons executed, including an old man of 80 years. This drew upon him the wrath of the Neapolitans. King Ferdinand II., however, appointed him minister of police in 1831. For some time he exercised almost absolute power in Naples. In 1837, when the cholera raged in Sicily, and the people were persuaded that it had been intentionally brought into the country by the government, Carretto was despatched to Catania, where the insurgents had organized a provisional government; and although this on his arrival had already been abandoned, he again exercised his authority by ordering the execution of more than 100 per-

sons, even applying the torture to the prisoners. The king was finally compelled to yield to the clamors of the people, and dismiss him. During the night of Jan. 27, 1848, he was arrested and put on board a French steamer, as an exile to France. When the name of the passenger became known at Leghorn, the supply of coals was withheld from the steamer. In Genoa he was not permitted to go on shore. He afterward returned to Naples, but was not restored to office, though he was loaded with favors by the king.

CARRICKFERGUS, a parliamentary borough and seaport of Ireland, county Antrim, situated on Belfast lough, 7 m. N. E. of Belfast; pop. in 1871, 9,452. The town extends about a mile along the shore of Carrickfergus bay, and consists of three parts: the old or walled town in the centre, the Irish quarter on the west, and the Scotch quarter on the east. The inhabitants of the last mentioned quarter are chiefly fisher-



Carrickfergus Castle.

men, descendants of a colony whom religious persecution drove thither in the 17th century. There is an old castle, once very strong, and still fortified. The other public buildings worthy of note are the parish church, an antiquated structure in the form of a cross, and the court house. There are also places of worship for Catholics, Presbyterians, Methodists, and Unitarians. There are flax-spinning mills, a muslin bleach green, and a linen bleach mill and green in the vicinity; and some trade is also carried on in tanning, brewing, and distilling. There is a semi-annual fair. It returns one member to parliament. In ancient times the town was frequently attacked by the Scots. William III. landed here, June 14, 1690. In the roads opposite the town the British sloop of war Drake was captured by Paul Jones, April 24, 1778.

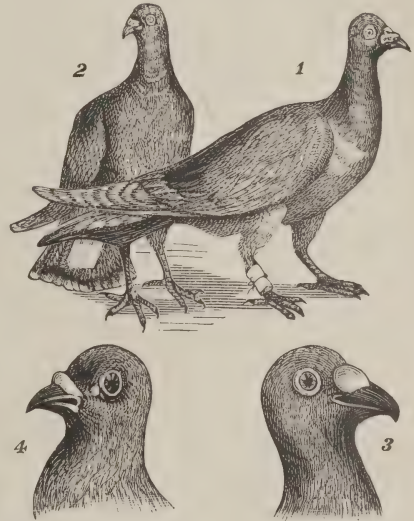
CARRIER, Jean Baptiste, a French revolutionist, born near Aurillac in 1756, executed in

Paris, Dec. 16, 1794. Taking his seat in the national convention in 1792, he supported the establishment of the revolutionary tribunal, voted for the death of Louis XVI., presented a motion for the arrest of Philippe Égalité, duke of Orleans, and participated actively in the popular rising of May 31 against the Girondists. His revolutionary zeal caused him to be sent to Normandy, then to Nantes, where he arrived Oct. 8, 1793. The western departments were troubled by civil war, and he ordered numerous arrests, and sent victims to the scaffold on the slightest suspicion. He soon dispensed with even a show of trial; without any judicial proceedings, prisoners were murdered by wholesale; and as the guillotine did not afford sufficient means of execution, boats provided with valves were procured, which, after receiving on board hundreds of prisoners, were towed to the middle of the Loire, where they were sunk to the bottom with their human cargo. The first of these *noyades de Nantes* comprised 94 priests; several others took place in which women and children were mingled with men. The prisoners were confined in a vast building called the warehouse; every day, at nightfall, numbers of them were summoned on board the fatal boats, and their death was hidden in the darkness of night. He also invented the so-called "republican marriage," in which victims were tied in couples, sometimes a man and woman together, then flung into the river, or forced from the boat by the sword or bayonet. Meanwhile numbers of prisoners were also shot in the vicinity of Nantes. The convention was for a while kept ignorant of these scenes; the killing of prisoners he reported as the "translation of culprits." The citizens of Nantes did not dare to denounce him, as they were under the impression that he acted in accordance with the orders of the convention. At last the assembly became aware of the real state of things, and Carrier was recalled by the committee of public safety. Strongly denounced by public opinion after the fall of Robespierre, he was arraigned before the revolutionary tribunal, Nov. 25, 1794, and sentenced to death.

CARRIERE, Moritz, a German philosopher, born at Griedel, March 5, 1817. He studied at Giessen, Göttingen, and Berlin, and perfected his knowledge of art in Italy. In 1842 he became private teacher in the university, in 1849 professor at Giessen, and in 1853 at Munich, where he lectures chiefly on æsthetics at the university and on art history at the academy. He has written various works on philosophy, religion, poetry, and æsthetics, translated into German the letters of Abélard and Héloïse, composed a poem on the last night of the Girondists, urged the conversion of the cathedral of Cologne into a free church, and developed his liberal ideas in an essay on Cromwell. He has also prepared annotated editions of Goethe's *Faust* and Schiller's *Wilhelm Tell*; and during the

Franco-German war he delivered lectures on *Die sittliche Weltordnung in den Zeichen und Aufgaben unserer Zeit* (Munich, 1870), and on *Deutsche Geisteshelden im Elsass* (1871). He is foremost among German thinkers who seek to reconcile Christianity with science, art, and history, and who are opposed to ultramontanism. His most celebrated work is *Die Kunst im Zusammenhange der Culturentwicklung und die Ideale der Menschheit* (4 vols., Leipsic, 1863-'71).

CARRIER PIGEON, a variety of the common pigeon (*columba livia*). This, the *pigeon privé* of Bêlon, the *pigeon domestique* of Brisson, the wild rock pigeon of the British, and the *colommen* of the Welsh, is the stock from which ornithologists generally now agree that the domestic pigeon is derived. The varieties of this bird, produced under the fostering hand of man, the tumblers, croppers, jacobines, runts, spots,



1, 2. Methods of attaching Letters. 3. Liège Carrier.
4. Antwerp Carrier.

turbits, owls, nuns, &c., would fill a volume; the carrier, however, demands especial notice. The carrier pigeon is a bird larger than the common pigeon, measures about 15 inches in length, and weighs about 1½ lb. The neck is long, and the pectoral muscles are very large, indicating a power of vigorous and long-continued flight. An appendage of naked skin hangs across its bill, and continues down on either side of the lower mandible. According to its size and shape the amateurs of carrier pigeons estimate the value of the bird. They consider those pigeons the best that have the appendage rising high on the head, and of considerable width across the bill, and that are also distinguished by a wide circle around the eyes, destitute of feathers. The instinct which renders this bird so valuable is its very strong love of home, which is in some degree common

to all the domesticated varieties. The mode of training them in Turkey, where the art is supposed to be carried to the greatest perfection, is this: The person who has the charge of rearing and training them takes the young pigeons when they have got their full strength of wing in a covered basket to a distance of about half a mile from their home; they are then set at liberty, and if any of them fail in returning home from this short distance, they are considered stupid, and are rejected as valueless. Those that return home are then taken to greater distances, progressively increased to 1,000 miles, and they will then return with certainty from the furthest parts of the kingdom. In England it is usual to keep these birds in a dark place for about six hours before they are used; they are then sparingly fed, but have as much water given them as they will drink. The paper on which the message is written should be carefully tied round the upper part of the bird's leg, but so as in no wise to impede its flight. It appears from an English ballad, and from a line in Tasso, that in older times the original way of suspending the despatch was from the wing or round the neck; but the above method is that now adopted.—The antiquity of the use of these birds for the purpose of bearing intelligence to distant parts or persons, and the perseverance with which some varieties (that which is named, from its peculiar fitness, the carrier more especially), when well trained, will return from long distances, is well known; but it is not known when or by whom the pigeon was first applied to this purpose. We have the authority of Sir John Mandeville that the Asiatics used them for the same purpose as the Romans. During the crusade of St. Louis they were so employed; Tasso presses them into service in the siege of Jerusalem, making Godfrey defend one when attacked by a falcon; and Ariosto makes the castellan di Damiata spread the news of Orriolo's death by a messenger dove. During the late siege of Paris these birds were employed to convey messages beyond the German lines; very long documents, printed by micro-photography on films indestructible by water, and weighing only a few grains, were thus transmitted with great success. The ordinary rate of the flight of carrier pigeons is not generally held to exceed 30 miles an hour, although instances of a double or even triple rate of velocity are recorded.—The education of carrier pigeons is entirely progressive; the distance flown being gradually and slowly increased from half a mile up to 20 or 30 miles. When the bird is able to accomplish this, he may be trusted to fly any distance overland, within the limits of physical power. The younger the bird is, if it have strength to fly well, the greater is the chance of educating it to be a good bearer of a despatch. If this drilling be not commenced early, birds of the best breed cannot be trusted. When thrown up the bird rises, and when it has reached a good height

will at first fly round and round evidently for the purpose of finding some well known landmark, and then make off, continuing on the wing without stop or stay, unless prevented, till its home is reached. If no such landmark is found, the bird is lost. Thus pigeons, when loosed from a balloon at a great height, have, after flying round and round, returned to the balloon for want of objects to guide them in their homeward flight. The magnetic telegraph has now rendered the service of carrier pigeons, unless in times of siege, of little use.

CARRIGALINE, a parish of Ireland, in the county and 8 m. S. of Cork; pop. about 7,000. It contains fine marble and slate quarries. The village, on Owenboy river, possesses some archaeological interest on account of a ruined castle of the earls of Desmond, and the remains of a religious house and of a Danish fort in the vicinity. The church is a fine building in the perpendicular style. In a neck of the river near by Sir Francis Drake once took shelter, when hard pressed by a Spanish fleet.

CARRO, Jean de, a German physician, born in Geneva, Aug. 8, 1770, died at Carlsbad, March 12, 1857. Taking up his abode in Vienna in 1795, he became celebrated by his efforts in spreading Jenner's system of vaccination as a protection against smallpox in Germany, Hungary, Poland, and Russia. In 1800 he sent a quantity of virus to Lord Elgin at Constantinople, together with a work of his own, translated into Turkish, on vaccination. The attempts of the English to introduce vaccination into India having been unsuccessful, because the virus had deteriorated on the way, Carro procured vaccine matter from cows of Lombardy, and sent it to Dr. Harford at Bagdad. This retained all its strength, and was the means of introducing kinpox inoculation into India. The Hindoos consider it to be derived from a sacred cow, to which they give the name of *amurtum*, or immortality. Carro published *Observations et expériences sur l'inoculation de la vaccine* (Vienna, 1801); *Histoire de la vaccination en Turquie, en Grèce et aux Indes Orientales* (1803); *Carlsbad et ses eaux minérales* (1827); and *Vingt-huit ans d'observation et d'expériences à Carlsbad* (1853). For many years he published annually the *Almanach de Carlsbad*.

CARROLL, the name of 14 counties in the United States. **1.** An E. county of New Hampshire, bordering on Maine; area, about 560 sq. m.; pop. in 1870, 17,332. Lake Winnipiseogee separates it from Belknap county on the S. W., and within its own limits are several smaller lakes and ponds and numerous small streams. The surface is mountainous and broken, Ossipee mountain and Conway peak being the principal summits. The soil is productive, but much labor is required for its cultivation. The Portland and Ogdensburgh railroad runs to North Conway, and the Portsmouth, Great Falls, and Conway railroad is being extended into the county. The chief productions in

1870 were 17,034 bushels of wheat, 106,385 of Indian corn, 59,853 of oats, 327,694 of potatoes, 43,052 tons of hay, 504,194 lbs. of butter, 32,766 of wool, and 177,270 of maple sugar. There were 3,018 horses, 6,801 milch cows, 5,122 working oxen, 8,784 other cattle, 9,059 sheep, and 2,747 swine. There were 2 manufactories of boots and shoes, 5 of carriages and wagons, 4 of furniture, 9 tanneries, 7 currying establishments, 9 saw mills, 2 wool-carding and cloth-dressing establishments, 2 manufactories of cotton and woollen machinery, and 1 of woollen goods. Capital, Ossipee. **II.** A N. county of Maryland, bordering on Pennsylvania, drained by the sources of the Patapsco and Monocacy rivers; area, about 500 sq. m.; pop. in 1870, 28,619, of whom 2,175 were colored. The surface is hilly, and the soil thin, but well cultivated. Copper and iron ores are found. The Baltimore and Ohio railroad skirts the S. part, and the Western Maryland line passes through the county. The chief productions in 1870 were 427,586 bushels of wheat, 35,257 of rye, 716,887 of Indian corn, 425,019 of oats, 118,072 of potatoes, 30,766 tons of hay, 823,759 lbs. of butter, 19,012 of wool, and 225,800 of tobacco. There were 6,564 horses, 8,945 milch cows, 5,531 other cattle, 5,279 sheep, and 19,265 swine. There were 7 manufactories of agricultural implements, 18 of carriages and wagons, 10 of furniture, 3 of iron castings, 17 of saddlery and harness, 11 of tin, copper, and sheet-iron ware, 3 of woollen goods, 5 saw mills, 29 flour mills, 13 tanneries, and 8 currying establishments. Capital, Westminster. **III.** A S. W. county of Virginia, bordering on North Carolina, having the Alleghany mountains on the N. W. and the Blue Nose on the S. E., and drained by affluents of the Kanawha river; area, 440 sq. m.; pop. in 1870, 9,147, of whom 328 were colored. The soil is rough and hilly, but generally adapted to cultivation and grazing. There are mines of copper, iron, and lead. Grayson sulphur springs are much resorted to in summer. The chief productions in 1870 were 13,382 bushels of wheat, 25,080 of rye, 91,772 of Indian corn, 42,658 of oats, 10,837 of potatoes, 2,713 tons of hay, and 74,893 lbs. of butter. There were 1,200 horses, 2,186 milch cows, 3,417 other cattle, 8,632 sheep, and 7,648 swine. Capital, Hillsville. **IV.** A W. county of Georgia, bordering on Alabama; area, 572 sq. m.; pop. in 1870, 11,782, of whom 1,309 were colored. The Chattahoochee and the Tallapoosa are the principal rivers. The surface is mountainous, and the soil, which rests chiefly on a granite foundation, is fertile in many parts of the county. One or two gold mines are worked with profit. The chief productions in 1870 were 40,981 bushels of wheat, 215,338 of Indian corn, 8,997 of oats, 29,640 of sweet potatoes, 113,083 lbs. of butter, and 1,964 bales of cotton. There were 849 horses, 2,354 milch cows, 3,747 other cattle, 5,484 sheep, and 11,892 swine. Capital, Carrollton.

V. A N. W. county of Mississippi drained by branches of the Yallobusha and Yazoo rivers, and bounded S. E. by the Big Black; pop. in 1870, 21,047, of whom 11,550 were colored. The former area was 850 sq. m., but a portion was taken in 1870 to form Grenada county. The surface is level, and the soil alluvial and remarkably fertile. The Mississippi Central railroad passes through the E. part. The chief productions in 1870 were 6,821 bushels of wheat, 433,245 of Indian corn, 29,794 of sweet potatoes, and 14,135 bales of cotton. There were 1,809 horses, 2,552 mules and asses, 4,346 milch cows, 8,566 other cattle, 3,955 sheep, and 20,388 swine. There were 5 saw mills and 1 manufactory of cotton goods. Capital, Carrollton. **VI.** A N. E. parish of Louisiana, bordering on Arkansas, between the Mississippi river and Bœuf bayou; area, 1,050 sq. m.; pop. in 1870, 10,110, of whom 7,718 were colored. The surface is generally level. The chief productions in 1870 were 142,525 bushels of Indian corn, 12,765 of sweet potatoes, and 20,384 bales of cotton. There were 683 horses, 1,424 mules and asses, 1,504 milch cows, 3,164 other cattle, and 5,051 swine. Capital, Providence. **VII.** A N. W. county of Arkansas, bordering on Missouri, and intersected by Long creek and King's and White rivers; pop. in 1870, 5,780, of whom 37 were colored. The former area was 1,038 sq. m., but a portion has recently been taken to form Boone county, while a part of Madison county has been added to this. The surface is diversified, and the soil generally fertile. Several quarries yield excellent variegated yellow marble. The chief productions in 1870 were 20,438 bushels of wheat, 172,696 of Indian corn, 45,447 lbs. of butter, 15,445 of tobacco, and 6,226 gallons of molasses. There were 1,957 horses, 1,135 milch cows, 2,517 other cattle, 4,590 sheep, and 14,174 swine. There were 5 saw mills in the county. Capital, Carrollton. **VIII.** A W. county of Tennessee, drained by affluents of the Big Sandy and Obion rivers; area, 625 sq. m.; pop. in 1870, 19,447, of whom 4,799 were colored. The surface is flat, and the soil fertile. There are extensive forests of oak, hickory, maple, and black walnut. The Louisville and Memphis and the Nashville and Northwestern railroads traverse the county. The chief productions in 1870 were 93,872 bushels of wheat, 777,922 of Indian corn, 272,083 lbs. of butter, and 5,023 bales of cotton. There were 3,517 horses, 2,265 mules and asses, 4,076 milch cows, 5,362 other cattle, 10,822 sheep, and 35,018 swine. There were 5 flour and 4 saw mills, and 3 wool-carding and cloth-dressing establishments. Capital, Huntingdon. **IX.** A N. county of Kentucky, bordering on Indiana, bounded N. by the Ohio, and intersected by the Kentucky river; area, about 200 sq. m.; pop. in 1870, 6,189, of whom 540 were colored. In the N. part the surface is occupied by steep hills; elsewhere the land is undulating and fertile. Most of the soil is calcareous, and

limestone is abundant. The Louisville, Cincinnati, and Lexington railroad passes through the S. part. The chief productions in 1870 were 38,236 bushels of wheat, 263,629 of Indian corn, 26,965 of potatoes, 12,640 lbs. of wool, and 669,875 of tobacco. There were 2,058 horses, 1,282 milch cows, 2,480 other cattle, 3,495 sheep, and 6,489 swine. There were 4 flour and 3 saw mills, and 1 manufactory of woollen goods. Capital Carrollton. **X.** An E. county of Ohio; area, 360 sq. m.; pop. in 1870, 14,491. It is somewhat hilly, but well watered and fertile. Hard coal and iron ore are found. The Tuscarawas branch of the Cleveland and Pittsburgh railroad, and the Carrollton and Oneida railroad traverse the county. The chief productions in 1870 were 211,008 bushels of wheat, 23,699 of rye, 417,864 of Indian corn, 520,663 of oats, 75,819 of potatoes, 27,133 tons of hay, 600,785 lbs. of butter, and 538,589 of wool. There were 5,628 horses, 6,314 milch cows, 6,720 other cattle, 131,069 sheep, and 10,230 swine. There were 3 flour, 3 saw, and 3 planing mills, 7 tanneries, and 5 currying establishments. Capital, Carrollton. **XI.** A N. W. central county of Indiana, drained by the Wabash and Tippecanoe rivers; area, 378 sq. m.; pop. in 1870, 16,152. The surface is diversified and well timbered, and the soil productive. It is traversed by the Wabash and Erie canal, and by the Toledo, Wabash, and Western railroad. The chief productions in 1870 were 521,689 bushels of wheat, 401,635 of Indian corn, 65,738 of oats, 36,834 of potatoes, 7,475 tons of hay, 236,988 lbs. of butter, and 69,452 of wool. There were 5,175 horses, 4,268 milch cows, 6,640 other cattle, 19,942 sheep, and 18,338 swine. There were 5 manufactories of carriages and wagons, 2 of wrapping paper, 1 of sashes, doors, and blinds, 2 of woollen goods, 5 brick kilns, 13 flour and 23 saw mills. Capital, Delphi. **XII.** A N. W. county of Illinois, separated from Iowa on the W. by the Mississippi river; area, 416 sq. m.; pop. in 1870, 16,705. The surface is rolling, and divided between prairie lands and forests, and there are extensive lead mines. It is traversed by the Western Union railroad. The chief productions in 1870 were 418,333 bushels of wheat, 25,721 of rye, 1,367,965 of Indian corn, 775,100 of oats, 123,466 of barley, 133,949 of potatoes, 25,610 tons of hay, 532,486 lbs. of butter, and 32,659 of wool. There were 9,813 horses, 7,984 milch cows, 14,613 other cattle, 7,342 sheep, and 26,213 swine. There were 6 manufactories of carriages and wagons, 10 of saddlery and harness, 2 of malt liquors, 9 flour and 2 saw mills. Capital, Mt. Carroll. **XIII.** A W. central county of Iowa, drained by North and Middle Raccoon rivers, and the West Nishnabotunga; area, about 600 sq. m.; pop. in 1870, 2,451. The climate is healthy and the soil fertile. Coal, iron, building stone, and timber are abundant. The Chicago and Northwestern railroad passes through

it. The chief productions in 1870 were 65,758 bushels of Indian corn, 12,525 of oats, 68,830 of wheat, and 2,189 tons of hay. There were 745 horses, 503 milch cows, 1,107 other cattle, and 1,528 swine. Capital, Carrollton. **XIV.** A N. W. central county of Missouri, lying between the Missouri river on the W. and Grand river on the E.; area, 700 sq. m.; pop. in 1870, 17,446, of whom 827 were colored. The surface is somewhat uneven, and in many places is covered with thick forests of oak, black walnut, and other trees. The soil, which rests on beds of limestone and sandstone, is generally productive. The western division of the North Missouri railroad traverses it. The chief productions in 1870 were 233,069 bushels of wheat, 1,205,966 of Indian corn, 192,829 of oats, 4,986 tons of hay, 186,278 lbs. of butter, 41,821 of wool, and 256,578 of tobacco. There were 7,542 horses, 1,787 mules and asses, 5,729 milch cows, 10,407 other cattle, 17,171 sheep, and 34,499 swine. There were 4 manufactories of saddlery and harness, 3 of tin, copper, and sheet-iron ware, and 7 flour mills. Capital, Carrollton.

CARROLL, Charles, of Carrollton, a patriot of the American revolution, the last surviving signer of the Declaration of Independence, born at Annapolis, Md., Sept. 20, 1737, died Nov. 14, 1832. In 1745 he was taken to the college of English Jesuits at St. Omer, France, where he remained six years, and then went to the Jesuit college at Rheims. After two years he went to Bourges to study the civil law, and after remaining there one year spent the next two in Paris, whence he repaired to London and began the study of law in the Temple. In 1764 he returned to America, and in 1768 married Mary Darnell. He inherited a vast estate, the last of the manorial grants of Maryland, and at the commencement of the revolutionary war was considered the richest man in the colonies, his property being estimated at \$2,000,000. In 1770-'71 he wrote articles, under the signature of "The First Citizen," against the right of the government to regulate fees by proclamation. In 1775 he was chosen a member of the first committee of observation established at Annapolis; and during the same year he was elected a delegate to the provincial convention. In February, 1776, he was appointed one of the commissioners to proceed to Canada in order to induce the inhabitants of that country to unite with the colonies. He returned in June, and on the 12th presented their report. He found the declaration of independence under discussion, and the delegates of Maryland shackled by instructions "to disavow in the most solemn manner all design in the colonies of independence." He hastened to Annapolis to procure a withdrawal of these instructions. Together with Judge Chase, he labored so assiduously that on June 28 the instructions were withdrawn and the delegates authorized to join in a declaration of independence. On July 4, 1776, he was appointed a delegate to congress,

and on Aug. 2, when the declaration was first formally signed, he was one of the earliest signers. As he affixed his signature a member observed, "There go a few millions;" and adding, "however, there are many Charles Carrolls, and the British will not know which one it is," Mr. Carroll immediately added to his name "of Carrollton," and was ever afterward known by that title. He took his seat July 18, and was soon afterward placed in the board of war. In the latter part of 1776 he was one of the committee to draft the constitution of Maryland, and in December of the same year he was chosen to the senate of that state. In 1777 he was reappointed a delegate to congress. In 1781 and 1786 he was reelected to the Maryland senate, and in 1788 chosen a United States senator. In 1797 he was again elected to the senate of Maryland, and in 1799 he was appointed one of the commissioners to settle the boundary line between Virginia and Maryland. In 1810 he retired from public life, and afterward devoted his time to the management of his estate. On July 4, 1821, the fact that only four of the signers of the Declaration of Independence were still living was noticed in many of the newspapers. Of these, William Floyd of New York died 30 days afterward. The death of John Adams and Thomas Jefferson on July 4, 1826, left Charles Carroll of Carrollton the last surviving signer. In the performance of their obsequies, funeral honors being paid them in Baltimore as in many other cities, Mr. Carroll was chief mourner. On July 4, 1828, after he had passed the age of 90 years, in the presence of a vast concourse of spectators and attended by an imposing civic procession, he laid the corner stone of the Baltimore and Ohio railroad.

CARROLL, John, an American prelate, born at Upper Marlborough, Md., in 1735, died Dec. 3, 1815. He was educated in the colleges of St. Omer and Liège, at the latter of which he was ordained a priest, and after surrendering his patrimonial estate to his brother became a member of the society of Jesus. Upon the dissolution of that society in France in 1762, he acted as the secretary of the dispersed fathers in their remonstrance with the court of France respecting the temporal interests of the order. He then went to England, and was selected by a Catholic nobleman to accompany his son as tutor in a tour of Europe. On his return to the continent in 1773, he was for a short time professor at Bruges and afterward retired to England, living with the family of the earl of Arundel. On the breaking out of the troubles between Great Britain and the American colonies, he returned to America, and was invited by a special resolution of congress to accompany his cousin, Charles Carroll of Carrollton, Dr. Franklin, and Samuel Chase on a political mission to Canada, from which it was hoped that great benefits would ensue to the colonial cause. After the establishment of peace the Roman Catholic clergy of the United

States petitioned the pope for the establishment of a hierarchy in this country, and at Dr. Franklin's instance Mr. Carroll was appointed vicar general in 1786, when he fixed his abode in Baltimore. In 1789 he was appointed the first Catholic bishop in the United States. He was consecrated in England, assuming the title of bishop of Baltimore; and in 1815, shortly before his death, he was created archbishop.

CARRON, a small river of Scotland, 14 m. long, rising between the friths of Forth and Clyde, and flowing into the frith of Forth, about 3 m. N. of Falkirk. About half a mile from the stream, near Falkirk, is the battle ground where the English defeated Wallace in 1298. The Carron was the boundary of the Roman empire, the wall of Antoninus running close to and parallel with it for several miles. In the early part of the 5th century many battles between the Romans and the Scots and Picts were fought near this river. The village of Carron, on its banks, is known for its large iron works, established in 1760, at which the kind of cannon called carronades was first constructed in 1779.

CARROT (*daucus carota*, Tourn.), a plant of the natural order *umbelliferæ*, or parsley family. It is a biennial, bearing seeds on stems 2 to 2½ ft. high, in clusters called umbels. It may be seen growing in its wild state in pastures, where it is a great pest. The tap root of the domesticated carrot is raised from seeds sown in cultivated ground, and has long been used in soups and stews, and is a favorite in Germany and France. It is a promoter of digestion, and is especially valued as a substantial food for horses and other stock. Butter of an excellent quality and bright color can be made by feeding a peck of carrots morning and night to each milch cow. They can be raised at the rate of 500 to 1,500 bushels per acre. The best soil is a deep dry loam, rich from previous manuring. The carrot germinates slowly, requiring about three weeks before it appears above ground. This slow growth allows the weeds time to start, and makes culture more expensive. To avoid this, it has been the practice with many to drill radishes, mustard, or oats with them, to mark the rows at an early period so as to allow the spaces between the rows to be cleaned, even before the plants are up. Some growers place the seed in a bag, and bury it in the earth until it begins to swell and show signs of sprouting, when it is rolled in plaster and planted. The amount of seed required is 2½ to 4 lbs. per acre, depending on nearness of drills; if radishes are sown with them, an equal bulk will be required. Early carrots for house use are sown as soon as the soil is fit to receive the seed. Field carrots do better, sown from May 10 to June 10. In England carrots are best grown on ridges, but in our warm climate flat culture is to be preferred. In gardens they are sown in drills 15 to 20 in. asunder, and cultivated by hand. In the field they are planted from 24 to 30 in. apart, grown

more thickly in the drill, and tilled by horse power. The land is deeply ploughed, subsoiled, smoothly harrowed, and rolled. The seed is sown from a drill barrow at a depth of one half to three quarters of an inch. Some drilling machines sow a special manure with the seed, which is advantageous in giving the plants an early start. Should any manure be required, it would be advisable to use soluble special manures, made with regard to the wants of the plant and the deficiencies of the soil. The best Peruvian guano, mixed with many times its bulk of muck or charcoal dust, will answer a good purpose if ploughed in the soil before planting; 300 to 500 lbs. per acre will be required for a good dressing. Soluble superphosphate of lime, with about one third its weight of guano, probably forms one of the best general manures for carrots. Ten bushels of common salt per acre will add to its value; and on most soils 25 or 50 bushels of unleached wood ashes dressed over the surface separately from and after the other manures, so that they will not come in immediate contact with the ashes, will increase the yield. After-culture consists in frequent stirring of the soil with a horse hoe, root cleaner, or other similar instrument, which cuts close to the plant, and demolishes all weeds in spaces between the rows. In November the crop is lifted, by running a subsoil lifter close to a row of carrots at full depth, say 10 to 20 inches; this will loosen the whole soil, and the roots may be readily pulled, the tops removed with a knife, fed to the cattle, or left on the ground to be ploughed under for manure, while the roots are stored in a cool cellar, where an even temperature just above freezing is maintained; or they may be pitted in long narrow piles in the field, covered with two or three inches of long rye straw and several inches in depth of earth, leaving straw chimneys to ventilate the pits. When fed to cattle, they should be washed in clean water, and cut in thin slices, and given alone or with other food. The meal for fattening cattle should be sprinkled over carrots.

CARSON, Christopher, popularly known as **KIT CARSON**, an American mountaineer, trapper, guide, and soldier, born in Madison co., Ky., Dec. 24, 1809, died at Fort Lynn, Colorado, May 23, 1868. While he was yet an infant his family emigrated to what is now Howard co., Mo. At 15 years of age he was apprenticed to a saddler, with whom he continued two years. The next eight years of his life were passed as a trapper, which pursuit he relinquished on receiving the appointment of hunter to Bent's fort, where he continued for eight years more. He was then engaged by Fremont as guide in his explorations. In 1847 he received an appointment as lieutenant in the rifle corps of the army. In 1853 he drove 6,500 sheep to California, a difficult but successful undertaking. On his return to Taos he was appointed Indian agent in New Mexico, and was instrumental in bringing about many treaties with

the Indians. During the civil war he rendered important services in New Mexico, Colorado, and the Indian territory, rose to the rank of colonel, and was brevetted brigadier general. He died from the rupture of an artery in the neck.—See "Life of Kit Carson," by Charles Burdett (Philadelphia, 1869).

CARSON CITY, the seat of justice of Ormsby co., Nevada, and capital of the state, situated in Eagle valley, 4 m. from Carson river, and 178 m. N. E. of San Francisco; pop. in 1870, 3,042, of whom 697 were Chinese. It is in a fertile and picturesque region. The Sierra Nevada mountains rise abruptly on the west, while the valley of the Carson extends far to the north and east. A railroad connects it with Virginia and Gold Hill, in Storey co., which is used chiefly to transport ore from the mines at those places to the crushing mills on the Carson river, and to carry back timber, which is abundant on the slopes of the Sierra Nevada. The state house is in course of construction. The branch mint occupies a fine building. The deposits of bullion for the year ending June 30, 1872, amounted to \$8,564,436 69, of which \$4,371,573 55 were gold, and \$4,192,863 14 silver. The total deposits of gold to that date were \$5,499,537 59. The total coinage, including silver bars, has been 441,449 pieces, valued at \$10,881,428 13, of which 77,029 pieces, valued at \$874,461 05, were gold, and 364,420 pieces, valued at \$10,006,607 08, were silver. The state prison is at Warm Springs, 2 m. to the east. There are four quartz mills, with 76 stamps, for the production of silver, and several churches, good schools, two daily newspapers, and the state and odd fellows' libraries. Carson City was founded as a ranch before the discovery of silver in Nevada, after which time it increased rapidly, being on the line of travel through the state previous to the opening of the Central Pacific railroad.

CARSTAIRS, or Carstares, William, a Scottish divine, born at Cathcart, near Glasgow, Feb. 11, 1649, died Dec. 28, 1715. He was educated at Edinburgh and Utrecht, devoted himself warmly to the prince of Orange, and became minister of an English church at Leyden. After returning home, he took offence at the conduct of the Episcopal party, through whose influence he was arrested, after which he retired again to Holland. He was brought back on a charge of having been accessory to the Rye House plot, and put to the torture in 1682. Being dismissed, with the king's pardon, he again went to Holland, where he rose still higher in favor with the prince of Orange, who made him his chaplain in 1685; and as King William's chaplain and confidential secretary, 1688-1702, he contributed much to the establishment of the Presbyterian government in Scotland. During the reign of Anne he still retained his chaplaincy. In 1704 he became professor of divinity at Edinburgh, and was four times moderator of the general assembly.

CARSTENS, Asmus Jakob, a German painter, born at Sanct Jürgen, near Schleswig, May 10, 1754, died May 26, 1798. He was a miller's son, and had a youthful passion for painting, but was placed in a mercantile house. After quitting his master he went to Copenhagen, where he supported himself for seven years by taking portraits in red chalk, producing during the time a large historical picture, the "Death of Æschylus," and another painting, "Æolus and Ulysses." In 1783 he started for Rome, but his means did not permit him to go beyond Mantua, where he remained a month and then went to Lübeck, where he lived five years in obscurity. He was then introduced by the poet Overbeck to a wealthy patron, by whose aid he went to Berlin, where his "Fall of the Angels," a colossal picture, containing over 200 figures, gained him a professorship in the academy of fine arts. Two years' labor in Berlin and a travelling pension enabled him in 1792 to go to Rome, and study the works of Michel Angelo and Raphael. Afterward he spent some time in Dresden, studying the works of Albert Dürer. His best works were designs in aquarelle and paintings in fresco; he rarely painted in oil. His biography was published in 1806 (new ed. by Riegel, 1867), and his works, engraved by Müller, in 1869.

CARTAGENA, or *Carthago* (anc. *Carthago Nova*, New Carthage), a seaport town of Spain, in the province and 29 m. S. S. E. of Murcia;

lat. 37° 36' N., lon. 0° 56' W.; pop., including suburbs, about 60,000. It is built at the head of a deep, well sheltered harbor, flanked by steep hills, defended by works at its mouth, and forming one of the best ports on the Mediterranean. The town itself is walled and neatly built; the streets are wide, regular, and relieved by several public squares. It is the seat of a bishop, and has an old cathedral, of little beauty, and now a simple church. There are several other churches, convents, hospitals, an observatory, an artillery park, a splendid arsenal, barracks, dock yards, founderies, ropewalks, and a glass factory. Notwithstanding its commodious port, the town has little commerce. The inhabitants are employed chiefly in lead and silver mining, fishing, and exporting barilla, grain, and esparto. The mineral wealth of the neighborhood was known in very early times, and the yield of silver enabled Hannibal to carry on his war against the Romans. The mine of La Carmen was opened in 1839, and the veins have since been successfully worked by a joint stock company.—Cartagena was founded by Hasdrubal, the Carthaginian general, about 230 B. C.; was taken by Scipio in 210, at which period, Livy states, it was one of the richest cities in the world; was almost destroyed by the Goths; rose to great importance in the time of Philip II., and became the great naval arsenal of Spain. It was formerly very unhealthy; but within a few years the draining of the Al-



Cartagena, Spain.

majar, a lake formed by the rains, has remedied this, and its population has in consequence considerably increased.

CARTAGENA, a fortified maritime city of the United States of Colombia, capital of a province of the same name and of the state of Bolívar, 410 m. N. N. W. of Bogotá; lat. 10° 25' N., lon. 75° 30' W.; pop. about 8,500. It is situated on an island beside the coast of the Caribbean sea, joined to the mainland by a series of artificial isthmuses, and to its suburb Jejemaní by a wooden bridge. Both the city and suburb are surrounded by freestone fortifications, and on the mainland is an eminence 150 ft. high, which is, however, overlooked by the summit of Mount Popa, 550 ft. above the level of the sea, and not fortified, although it has repeatedly served as a successful point of attack against the city. The streets are nar-

row, the widest not being over 30 ft. broad, but regular, with paved or flagged sidewalks, and lighted with gas. The houses are of stone and well built; the majority have but one story. There are numerous public edifices of some beauty, especially the churches of Santo Domingo and San Juan de Dios (both bomb-proof); the monasteries of Santa Teresa and Santa Clara; that of Nuestra Señora de la Popa, on the mountain of the same name; and the cathedral, which is noteworthy for its magnificent marble pulpit. Cartagena has a college, a naval school, a hospital, a theatre, &c. The port is one of the best on the N. coast of South America, and the only one in Colombia in which vessels can be repaired. The bay is divided into three sections: Boca Grande and Pascaballos, with a mean depth of 15 fathoms; Boca Chica, somewhat deeper, and defended



Cartagena, Colombia.

by two strong castles; and the Caldera, as deep as the first, and thoroughly sheltered. The entrance to the bay is rather difficult; the tides are extremely irregular, and the roadstead for large vessels is distant nearly 3 m. from the city. The excessive heat is somewhat tempered by frequent sea breezes. The climate is not extremely insalubrious, especially in the dry season from December to May; but yellow fever epidemics at times commit fearful ravages, and leprosy is not uncommon. The *lomba*, a disease closely resembling yellow fever, in 1872 carried off 6,000 victims in the course of a few months. Mosquitoes are very large and troublesome; and a small insect, the *comejen*, may destroy in a single night whole packages of silk, woollen, or linen fabrics. Maize, rice, beans, peanuts, yuca, and tobacco are produced in abundance, with plentiful supplies of cabinet and other woods, and various species of gums, medicinal plants, &c. The exports to the United States are tolu, caoutchouc, vegetable ivory, mora, hides, and some other commodities. Delicious fish are taken in the bay, which is besides remarkable for enormous turtles, and for the number, voracity, and hideous appearance of the sharks found in it.—Cartagena was founded by the Spaniards in 1533, and fortified at a cost of \$29,000,000. In 1544 it was seized by the French; it was taken by Sir Francis Drake in 1585, and again by the French in 1697. Admiral Vernon unsuccessfully besieged it in 1741. In 1815 it was taken by Bolivar, again surrendered to the royalists the same year, and was finally retaken by the republicans Sept. 25, 1821.

CARTAGO, an inland city of the United States of Colombia, in the state of Cauca, on the right bank of the river Cauca, 130 m. W. of Bogotá, for the trade of which city it is the entrepot; pop. about 8,000. It is situated at a slight elevation above the Cauca, and 3,500 ft. above the level of the sea. The streets are wide and well laid out, but poorly lighted; the houses are well built; and the surrounding country is exceedingly picturesque and highly cultivated. Cartago has a cathedral, two parish churches, and a Lancasterian and some other schools. Considerable droves of horned cattle and swine are raised in the neighbor-

hood; the various tropical fruits, sugar, cacao of superior quality, coffee, and tobacco, are abundantly produced, and form, with swine and jerked beef, the chief articles of export. The city was founded by the Spaniards in 1540, between the rivers Otan and Quindiu, and was at the end of the same century transferred to its present site.

CARTAGO, an inland town of Costa Rica, on the right bank of the river of the same name, 13 m. E. N. E. of San José. This town, once a populous and prosperous emporium, and the residence of the federal authorities, was almost swallowed up, Sept. 2, 1841, by an earthquake which left standing only 100 out of 3,000 houses, and one out of seven churches. The commercial importance of the place has ever since been on the decrease, and the population has dwindled to about 5,000, owing in part to the decrease of the Indians, who mainly form the working class. Near the town is an extinct volcano 11,480 ft. high.

CARTE, Thomas, an English scholar, born near Clifton, Warwickshire, in April, 1686, died near Abingdon, Berkshire, April 2, 1754. He studied at Oxford and Cambridge, received holy orders, and was appointed reader of the Abbey church at Bath. A sermon which he preached in January, 1714, in which he endeavored to vindicate Charles I. with regard to the Irish rebellion, engaged him in a controversy with Dr. Chandler and led to his first publication, entitled "The Irish Massacre set in a Clear Light." On the accession of George I. he declined taking the oath of allegiance, and therefore relinquished his ecclesiastical office. In 1715 he was suspected of being implicated in the rebellion, and was obliged to conceal himself at Coleshill. Having officiated as curate in that town for a short time, he became secretary to Bishop Atterbury. In 1722 he was strongly suspected of being concerned in the bishop's conspiracy, and a reward of £1,000 was offered for his apprehension; but he escaped into France and remained there 12 years under the assumed name of Phillips, until Queen Caroline obtained permission for him to return to England. In 1744 he again gave umbrage to the government, and was arrested, but soon discharged. His principal works consist of the

chief materials for an English edition of De Thou and Rigault (7 vols., London, 1733); a "Life of James, Duke of Ormond" (London, 1735-'6); and a "History of England" (4 vols., 1747-'55), which brings the history down to 1654; the manuscript for the remainder, to 1688, is preserved in the Bodleian library.

CARTER. I. A N. E. county of Tennessee, bordering on North Carolina, drained by affluents of Holston river, and by Doe river; area, about 350 sq. m.; pop. in 1870, 7,909, of whom 573 were colored. It occupies some of the highest ground in the state. The Iron mountain range, covered with timber and rich in mines of iron, extends along its S. E. border. Watauga river and other streams supply water power, which is extensively employed in iron works. The valleys are highly productive. A branch of the East Tennessee, Virginia, and Georgia railroad traverses the county. The chief productions in 1870 were 37,169 bushels of wheat, 132,097 of Indian corn, 63,396 of oats, and 2,155 tons of hay. There were 1,033 horses, 1,326 milch cows, 2,543 other cattle, 5,430 sheep, and 7,253 swine. There were 6 iron forges, 1 flour mill, and 1 manufactory of woollen goods. Capital, Elizabethtown. **II.** A N. E. county of Kentucky, intersected by the Little Sandy river and Tygert's creek; area, about 500 sq. m.; pop. in 1870, 7,509, of whom 100 were colored. The surface is hilly and broken. The soil near the rivers is tolerably fertile, but in other places unfit for cultivation. The mineral wealth is considerable, iron ore and stone coal being found among the hills in great quantities. The Elizabeth, Lexington, and Big Sandy railroad is to traverse the county. The chief productions in 1870 were 13,214 bushels of wheat, 282,691 of Indian corn, 41,507 of oats, 107,529 lbs. of butter, and 17,175 of wool. There were 1,805 horses, 1,747 milch cows, 2,892 other cattle, 8,614 sheep, and 7,988 swine. There were 2 manufactories of pig iron. Capital, Grayson. **III.** A S. E. county of Missouri, intersected by Current river; area, 500 sq. m.; pop. in 1870, 1,455, of whom 30 were colored. The surface is diversified by hills and valleys. Timber is plentiful, and copper and iron are found. The chief productions in 1870 were 4,992 bushels of wheat, 73,259 of Indian corn, 7,311 of oats, and 28,550 lbs. of tobacco. There were 417 horses, 470 milch cows, 1,047 other cattle, 1,182 sheep, and 3,589 swine. Capital, Van Buren.

CARTER, Elizabeth, an English authoress, born at Deal, Dec. 16, 1717, died in London, Feb. 19, 1806. She translated Epictetus (London, 1758), and also wrote some poems for the "Gentleman's Magazine," numbers 44 and 100 of the "Rambler," and published a volume of poems in 1738. Her poetical works exhibit much tenderness, simplicity of sentiment, and expressive sweetness. She never married.

CARTERET, an E. county of North Carolina, bordering on the Atlantic and Pamlico sound; area, 450 sq. m.; pop. in 1870, 9,010, of whom

2,725 were colored. Several long, narrow islands, on one of which is Cape Lookout, partially separate it from the sea, and Newport river flows through it. The surface is level, and much of it is occupied by swamps and pine forests. The Atlantic and North Carolina railroad passes through it. The chief productions in 1870 were 32,260 bushels of Indian corn, 58,715 of sweet potatoes, and 774 bales of cotton. There were 542 horses, 935 milch cows, 1,970 other cattle, 1,099 sheep, and 3,765 swine. There were 2 saw mills and 4 manufactories of tar and turpentine. Capital, Beaufort.

CARTERET, Philip, an English navigator, was captain of the *Swallow* in the expedition commanded by Samuel Wallis, which sailed Aug. 22, 1766, on a voyage of discovery to the South seas; but he parted from Wallis's vessel, the *Dolphin*, and made a separate expedition. He discovered Queen Charlotte's isles, and other islands, two of which he called Gower and Carteret. He returned to England Feb. 20, 1769, and a description of his voyage was given by Dr. Hawkesworth in the introduction to his narrative of Capt. Cook's first voyage.

CARTESIUS. See DESCARTES.

CARTHAGE (called by the Carthaginians *Karthadtha*, the new city; the *Carthago* of the Romans, *Καρχιδών* of the Greeks), an ancient city and state in the north of Africa. The city, near the site of modern Tunis, on a peninsula which extends into a small bay of the Mediterranean, was founded, according to the legend, by Dido, a Phœnician princess, about 880 B. C. Of the early history, first settlement, and chronology of Carthage, beyond the fact that the original colonists were Phœnicians from Tyre, nothing definite is known; and ancient writers materially differ as to the date of the foundation of the city. Probably it was older, as at one period it was more important, than its rival Rome, and soon after its settlement it became very populous by the influx of Africans who came thither for traffic. How long Carthage remained under a monarchy, or what events occurred in its early history, is unknown, at least for a period of 300 years; but from the beginning it was an important maritime and commercial city, with a trade extending to all the ports in the Mediterranean, and inland to the Nile and to the Niger. Beyond the straits of Hercules the commerce of Carthage reached to the W. coast of Africa, to northern Europe, and even, it is supposed, to the Azores. About 508 B. C. the Carthaginians made a treaty with the Romans, relating mainly to commerce; and by this treaty (whose genuineness is contested by modern scholars), which Polybius (iii. 22, 26) translated from the original brazen tablets in the capitol, it appears that Sardinia and a part of Sicily were then subject to Carthage. It gradually extended its supremacy over all the islands in the western half of the Mediterranean. Its foreign trade was mainly a monopoly, which the treaty with Rome shows it meant to maintain. Beyond her commercial importance, and

later in history something of her successes and reverses in war, less is known of Carthage than of any other nation of antiquity. She has left no literature, no monuments, no traces of her people or her language, with the exception of a few inscriptions on coins, and a few verses in one of the comedies of Plautus. Even among the writers of nations with whom she carried on commercial business and waged wars, the notices of her polity, population, religion, manners, and language are few and far between; and the Romans are charged with destroying the Punic archives for three centuries. Although the waters of every sea were white with her sails, and the shores of every land, hospitable or inhospitable, civilized or savage, were planted with her colonies or frequented by her mariners, no relic of her laws, language, or blood remains. Were it not for the wars which terminated her existence as a nation and a people, we should scarcely be aware of the existence of a city the inhabitants of which had visited the Western isles, the Canaries, and the Cape Verdes; had braved, if they had not actually crossed, the waters of the Atlantic; and had excavated the tin mines of Cornwall. Even of the Carthaginians in their wars we know little, and this is by the names and the deeds of her generals, several of whom were among the greatest of antiquity, not by the constitution, composition, or character of her armies. Through Aristotle and Polybius we have learned something of her political system and her government, and a little of her religion. Of her civic customs, social habits, domestic institutions, amusements, and industry, with the exception of some few hints in relation to her navigation, commerce, and agriculture, we are ignorant. No writer has so concisely and ably brought together what is known of the great commercial republic of antiquity as Dr. Thomas Arnold, in his "History of Rome," from which a portion of the following is condensed. In the middle of the 4th century B. C. the Carthaginians possessed the northern coast of Africa, from the middle of the Greater Syrtis to the pillars of Hercules, a country reaching from 10° E. to 6° W., and a length of coast which Polybius reckoned at above 16,000 stadia. In that part where the coast runs nearly N. and S. from the Hermæan headland or Cape Bon to the Lesser Syrtis was one of the richest tracts to be found; and here the Carthaginians had planted their towns thickly, and had covered the open country with their farms and villas. This was their *περιουσία*, the immediate domain of Carthage, where fresh settlements were continually made as a provision for the poorer citizens; settlements prosperous, indeed, and wealthy, but politically dependent. Distinct from these settlements of the Carthaginians were the sister cities of Carthage, founded by the Phœnicians of Tyre and Sidon. Among these colonies were Utica, Hadrumetum, the two cities known by the name of Leptis (situated the one

near the western extremity of the Greater Syrtis, and the other on the coast, between the Lesser Syrtis and the Hermæan headland) and Hippo. These were the allies of Carthage, and some of them were at the head of small confederacies of states. In the beginning the Phœnicians in Africa occupied their forts and domains by sufferance, and paid tribute to the natives, as an admission that they did not own the soil. Subsequently the settlers became sovereigns. The natives were driven back from the coasts and confined to the interior, where they became mere tillers of the soil, and were subject to despotic rule, to severe taxation, and to conscription for service in the Carthaginian armies. Inter-marriage of the settlers with the native women resulted in a race of half-castes, known as Liby-Phœnicians, or Afro-Phœnicians; and colonies of them were sent to the Atlantic coast of Africa, and probably of Spain also, beyond the pillars of Hercules. It is traditional that one voyage from Carthage was undertaken mainly to settle 30,000 Afro-Phœnicians on the African coast S. of the straits of Gibraltar. So early as the 7th century B. C. the trade of Carthage began with the Spanish seaports, especially with Tartessus or Tarshish. At the beginning of the 4th century B. C. the whole coast of Spain, both Atlantic and Mediterranean, was full of Carthaginian trading posts and settlements, mostly of small size and of little if any political importance. Sardinia and Corsica were both subject to Carthage, while on the shores of Sicily she had also strong fortresses, trading posts, seaports, and dockyards. From the natives of all these countries, as well as mercenaries from Gaul, Liguria, and the coasts of the Adriatic, were recruited the large and effective armies by which the Carthaginians maintained the quiet of their provinces, and pushed their foreign conquests.—The political constitution of Carthage is said to have resembled that of Sparta, in that it combined the elements of monarchy, of aristocracy, and of democracy. But it is difficult to ascertain exactly how they were combined, or which predominated, during the greater period of her existence. During her struggle with Rome the aristocratic element prevailed, and appears to have been an aristocracy mainly of commercial wealth, not of birth; although there was to a certain extent a hereditary nobility which furnished the two chief magistrates, variously called kings and suffetes, who formed originally the supreme and nearly despotic executive, as well as being leaders in war, but were reduced by successive usurpations of the nobility to functions and powers not differing essentially from those of the doges of Venice. Then there was a senate of 104 members, and also a council of 100 members. There seems to have been besides a pentarchy, who formed the highest magistracy. Davis conjectures that the senate had periodically five outgoing and five incoming members, and that those

whose term expired served for a period as a pentarchy, and could summon in times of perplexity 100 men for a select council. The multiplication of offices was a part of the system at Carthage, and the *suffetes*—a term identical with the Hebrew word which is rendered “judges” in the Scriptures—as well as the other principal magistrates, bought their dignities, so that high office was inaccessible except to the rich. The power of the commons was exceedingly small; they had neither originating powers nor judicial functions; yet, as ample provision was made for the poorer classes, and as the surplus population was always disposed of, profitably and advantageously to themselves, by a system of colonization at the government expense, the lower orders remained for many centuries contented with the constitution of their country. Polybius says that during her wars with Rome the constitution of the city became more and more democratic.—“The language of Phœnicia,” says Dr. Arnold, “was a cognate tongue with the Hebrew, if it were not, as is held by Gesenius and others of the best authorities, identical with the earliest Hebrew of the Old Testament, and varying from it no more than does the dialect of the later Hebrew writers. It is evident, however, from the fact that the Carthaginian tongue seems to have been nowhere studied by the inhabitants of the nations with whom they had treaties and constant commercial intercourse, even among the most learned men and the most distinguished scholars, that it could have contained little or nothing worthy of preservation.” Of their architecture and their arts we have as yet few relics and records. The houses of Carthage are believed to have been several stories high, of which the lower story alone was built of massive material, and the others were moulded, as Pliny says, of earth. When such buildings are pulled down, or decay, they are nothing but a heap of rubbish. The Romans rebuilt the city on top of this, and in digging their foundations they often cut through rich mosaic pavements and other ornaments of the lower stories of the original town. The mosaics recently excavated and considered relics of Punic Carthage are of exquisite workmanship. The city grew to be 23 m. in circuit, and had two harbors, an outer and an inner, the latter being surrounded by a lofty wall. Across the peninsula was a triple wall 3 m. long, and between the walls were stables for 300 elephants and 4,000 horses, and barracks for 2,000 infantry, with magazines and stores. Cothön, an island in the centre of the inner harbor, was lined with quays and docks for 220 ships. Above the city, on the western heights, was Byrsa, the citadel, as its Phœnician name signified, which, however, the Greeks identified with their *βύρσα*, hide, and thus formed their legend of the purchase of the spot on which the original town stood. (See Dido.) When it surrendered to the

Romans 50,000 people marched out of it. On its summit was the famous temple of *Æsculapius*. At the N. W. angle of the city were 20 immense reservoirs, each 400 ft. by 28,



Carthaginian Cistern.

filled with water brought by an aqueduct from a distance of 52 m. The suburb Megara, beyond the city walls, but within those that defended the peninsula, was the site of magnificent gardens and villas, which were adorned with every kind of Grecian art; for the Carthaginians were rich before the Romans had even conquered Latium. The navy was the largest in the world, and in the sea fight with Regulus there were 350 ships, carrying 150,000 men. Modern excavations have led to the discovery of the groundwork of a temple, probably that of Cronos, or Baal Hamman, and the quantities of fragments of precious marbles found about it indicate that it must have been gorgeously decorated. Some of the Punic inscriptions that have come to light are wonderful for the proportion and exquisiteness of the characters. Of their religion we know from Scripture and from more recent history that it was a cruel and bloody superstition. They worshipped on high places, and they had sacred groves, as well as idols. Their principal god was Baal, Belsamen, or the bright one, considered by the Greeks as identical with Cronos or Saturn, and who in process of time became in some features assimilated to Apollo. He was evidently the fire god or sun god, and to him were offered the human sacrifices, of children more especially, who were placed on the extended palms of the metallic statue, whence they rolled into a fiery furnace. With the sun god was associated a female deity, Ashtoreth or Astarte, expressive probably of the productive power of nature under the generative power of the sun, and worshipped as the queen of heaven. The worship of Ammon was associated with that of Baal and of the sacred elephant; while that of Melkarth (*Melk-karth*, king of the city), the Phœnician Hercules, was celebrated by the lighting of yearly funeral pyres, and the release of an eagle, typical of the sun and of the legendary phoenix. The offering of human sacrifices extended as far westward as

to Cadiz, where there existed a temple and statue of Baal-Saturn.—The first period of the history of Carthage extends to the beginning of the war with Syracuse, from the commencement of the city, whenever that occurred, nominally about 880 to 480 B. C.; during which time she had conquered her African empire, Sardinia, and the adjacent isles; waged wars with Massilia and the Etrurians, on commercial grounds; prosecuted her voyages of discovery, traffic, and colonization along the coasts of Spain and far out into the Atlantic; established trading intercourse with the Scilly isles and parts of the British coast; and, as some believe, pushed her adventures so far as to the inhospitable shores of the Baltic, where she is reported to have collected amber. About 480 begins the second period of Carthaginian history. It opens with their efforts to conquer and attach to their empire the great, rich, and fertile island of Sicily, and closes in 264 with the outbreaking of the first Punic war. The Syracusan war was waged long and with various success. In the simultaneous attempt of the Persians on the Hellenic, and the Carthaginians on the Sicilian Greeks, the Carthaginians under Hamilcar were defeated at Himera, by Gelon, tyrant of Syracuse, and Theron of Agrigentum, with nearly as much loss as was their ally, Xerxes, at Salamis. Tradition says that of 300,000 Carthaginians, 150,000 were killed in battle or flight, and the rest were taken prisoners; while of 2,000 ships of war and 3,000 transports, 8 only escaped, and these were cast away, only a few men saving themselves in a small boat and carrying to Carthage the news of the total loss of the fleet and army. As a condition of peace the Carthaginians were compelled to pay 2,000 talents in silver; build two temples, and renounce human sacrifices in their Sicilian trading posts and settlements. In the war with Hiero, Gelon's successor, about 410, Hannibal, son of Gisco, conquered and held in occupation the cities of Himera, Selinus, and Agrigentum. With Dionysius they were for a short time at peace, and then employed themselves in consolidating their former conquests on the island, which were now very rich and strong, consisting of well fortified seaports, fortresses, dockyards, naval stations, and garrisons, backed by considerable territorial domains of great productiveness and wealth. After the reestablishment of republicanism in the Greek cities by Timoleon, the Carthaginians were almost invariably unfortunate. Agathocles, however, on attempting, after the policy of Dionysius, to drive them out of the island, was defeated and besieged in his capital of Syracuse; but he broke out of the beleaguered city with a portion of his army, and carried the war into Africa. There he overran the open country, took 200 towns, and, although he was twice personally called back to Sicily to quell mutinies and restore order in his home dominions, actually maintained himself four entire years on African soil,

at the gates of Carthage. At length his fortune turned, his armies in Africa were obliged to surrender, and in the year 306 he concluded a peace which restored order to Sicily, and established both parties in possession of the territories each held before the breaking out of the war. After his death the Carthaginians increased their possessions and power in Sicily, and established themselves as actual masters and sovereigns of the Balearic isles, Corsica, Sardinia, and the Lipari islands, thus girding the whole Roman seaboard with a belt of insular fortresses. Thus far, however, all was peace and amity between the two great western republics of antiquity. Ten years after the retreat of Pyrrhus, the Romans were undisputed masters of Italy. Carthage had become yet more influential in Sicily, and was bent on converting influence and ascendancy into empire and possession. The little strait of Messina alone divided the possessions and separated the armed forces of the two powerful, ambitious, encroaching, and jealous states, and a contest between them was inevitable. It arose with the invocation of Roman aid by the Mamertines, belonging to an Italian city of Sicily, against the Carthaginians; this being gladly rendered, as by a people seeking pretext of war, gave birth to the first Punic war, which broke out in 264, and may be regarded as the commencement of the third period of Carthaginian history. This war lasted 23 years. It was waged (with the exception of the invasion, defeat, and capture of Marcus Regulus on Carthaginian territory) either on the island of Sicily or on the waters of the Mediterranean. On the latter, at first, the Romans suffered bloody defeats and maritime disasters. Still they persevered, and although when the war broke out they had not a ship of war, a mariner, or an officer who had seen sea service, in the end obtained the mastery of the Mediterranean, crushed the last fleet of the Carthaginians in a terrible conflict off the island of Favignana, at the W. angle of Sicily, and granted the peace which their enemy sued for, on condition that the Carthaginians should evacuate Sicily and all the isles thence to the Italian coast, release all Roman prisoners without exchange or ransom, and pay the expenses of the war, at the price of 3,200 Euboic talents, or \$3,337,888, within the space of ten years. (See *HAMILCAR*, and *HANNO*.) In the 22 years that followed before the commencement of the second Punic war, although the Carthaginians had lost Sardinia, of which the Romans, taking advantage of a mutiny of the Carthaginian mercenaries, made themselves masters, Carthage had more than repaired all her losses by the conquest and colonization of the vast and rich Spanish peninsula, with its virgin gold mines and its bold and hardy population, furnishing an inexhaustible supply of men to recruit the armies of the republic. Hannibal, the son of Hamilcar, forced the war by laying siege to Saguntum (now Murviedro),

an allied city of the Romans on the seacoast, and by crossing the Ebro contrary to protest, if not to treaty. The passage of Hannibal across the Alps, the victories of the Ticinus, the Trebia, Lake Thrasymentis, and Cannæ, the defeat on the Metaurus and the death of Hannibal's brother-in-law Hasdrubal, the 16 Italian campaigns, the simultaneous victories of the Roman arms in Spain and Sicily, the transfer of the war to Africa by the elder Scipio Africanus, the defeat of Zama, and the total submission, subjection, and disarming of Carthage, are the principal incidents of the second Punic war, which continued about 18 years, and was concluded in 201 by the virtual subjection of Carthage. (See HANNIBAL.) An interval of 52 years followed, during which Rome encouraged her allies to commit aggressions on Carthage; until that city, in despair, went to war to repel unendurable insult and provocation, regardless of the late treaty which forbade them to take up arms against any nation without consent of the Romans. After this the Romans, as the price of peace, extorted from them all their remaining ships of war, all their arms, military engines, and supplies, compelled them to give 300 hostages, and then commanded them, as the only alternative by which to escape destruction, to abandon their city and seashore position, and to remove 10 miles inland. The third Punic war resulted, and for three years (149-146) the unarmed, almost defenceless citizens of Carthage maintained a warfare of despair. At the end of that space a second Scipio, the son of Paulus Æmilius, the conqueror of Perseus, adopted by the son of the conqueror of Hannibal, took the city by storm, and destroyed it, razing it to the ground, passing the ploughshare over its site, and sowing salt in the furrows, the emblem of barrenness and annihilation. The inhabitants fought from street to street, while the houses burned over their heads, during 17 days, until 55,000 persons, the whole of the survivors of a nation, were shut up in the ancient citadel called Byrsa, where they surrendered at discretion, and were all sold into slavery. Hasdrubal only, the commander, with his wife, children, and 300 Roman deserters, took refuge in the temple of Æsculapius, with the determination to defend themselves to the last, and die under the ruins of the last Punic edifice. The heart of the leader failed him, and while his wife and all his followers met the death from which he meanly shrank, he surrendered himself to be led in triumph, and to die by the hands of the Roman carnifex in the Tullianum. About 30 years after the destruction of Carthage, a portion of the city was temporarily restored, and called Junonia, by 6,000 colonists whom C. Gracchus brought over from Rome. Long afterward, in 46 B. C., Cæsar planted a small colony on the ruins of Carthage; and Augustus, his successor, built a city, of the same name, at a small distance, which attained some eminence. It became an important Christian

bishopric A. D. 215. Cyprian held a council there in 252. It was conquered by Genseric from the Romans in 439, and continued to be the seat of the African empire of the Vandals until it was retaken by Belisarius in 534. It was finally destroyed by the Saracens in the caliphate of Abd-el-Melek in 698.—See Bötticher, *Geschichte der Karthager* (Berlin, 1827); Münter, *Religion der Karthager* (2d ed., Copenhagen, 1821); and Davis, "Carthage and her Remains" (New York, 1861). In connection with Phœnician antiquities, those of Carthage have been treated by Movers, Gesenius, and others.

CARTHAGENA. See CARTAGENA.

CARTHAGO NOVA. See CARTAGENA.

CARTHAMINE. See SAFFLOWER.

CARTHEUSER, Johann Friedrich, a German physician and naturalist, born at Hayn, Sept. 29, 1704, died at Frankfort-on-the-Oder, June 22, 1777. He studied medicine first at Jena and afterward at Halle, where he took the degree of doctor in 1731. He was appointed in 1740 professor of chemistry, pharmacy, and materia medica at the university of Frankfort-on-the-Oder, and shortly afterward to the chair of anatomy and botany. Still later he was named professor of pathology and therapeutics. He was also appointed rector of the university, and continued to hold his appointments till his death. He was made member of the academy of sciences, Berlin, in 1758. His chief merit consists in having introduced the method of submitting the various substances of materia medica to a strict ordeal of chemical analysis. He analyzed a great number of plants and other substances, and gave an exact account of the elements which enter into their composition. He published a considerable number of books and dissertations, among which are: *Elementa Chymicæ Medicæ Dogmatico-experimentalis* (Halle, 1736); *Fundamenta Materiæ Medicæ Generalis et Specialis* (2 vols., Frankfort, 1749-'50); and *De Morbis Endemicis Libellus* (Frankfort, 1772).

CARTHUSIANS, a branch of the religious order of the Benedictines, founded by St. Bruno in 1086. The first monastery of the order was built in a wild and solitary district six miles from Grenoble, in the department of Isère, known as La Chartreuse, whence the order took its name. The observances of the Carthusian monks were austere and penitential in an extraordinary degree, even among contemplative orders. They devoted a portion of their time to manual labor, consisting chiefly in the transcribing of ancient MSS. Their labors as agriculturists gained great renown for their name, for they reclaimed marshy and unhealthy neighborhoods, and caused the rocky and barren fastnesses of La Chartreuse and other desert regions to bloom with the fruits of patient and intelligent toil. They had rich and celebrated abbeys in England, France, and Germany. The Charterhouse in London was once a Carthusian monastery. The Certosa

of Pavia, and that of St. Elmo at Naples, are still visited by travellers, and for many years a Carthusian community occupied as a convent the baths of Diocletian at Rome. They de-



A Carthusian Monk.

clined rapidly at the close of the last century, and have not recovered in this. Since the suppression of religious houses in Italy the order is confined chiefly to the Grand Chartreuse and its filiations in France.

CARTIER, Sir George Étienne, a Canadian statesman, of the family of Jacques Cartier, born at St. Antoine, Sept. 6, 1814, died in England, May 20, 1873. He was educated at the seminary of St. Sulpice, Montreal, studied law, and in 1835 commenced practice in that city. In politics he became a follower of M. Papineau, and when the rebellion of 1837 broke out in Lower Canada, a price of \$2,000 was set on his head. He however escaped arrest, and in time an amnesty cast oblivion over the offence, and he lived to be entertained by Queen Victoria at Windsor castle. He was elected to the house of assembly from the county of Verchères in 1848. In 1856 he was appointed provincial secretary, and soon became attorney general. In November, 1857, he became leader of the Lower Canada section of the government, J. A. Macdonald being governor. After the provinces were confederated, and distinctions were conferred upon Canadians who had taken part in that change, Cartier considered himself slighted in being only created a commander of the bath while his colleague was knighted. Sir John Macdonald then advised the bestowal on Cartier of a higher title than that conferred on himself, and obtained for him a baronetcy. In August, 1858, Cartier became premier, with Macdonald for his chief Upper Canada colleague. He assisted in carrying the abolition of the feudal tenure in Lower Canada; in making the legislative council elective, and in that reactionary

measure which in 1867 reverted to the practice of crown nomination; in bringing about the codification of the laws of Lower Canada, and in judicial decentralization; and in originating and carrying out the confederation of British America. With the exception of an interval of about a year, he had held some cabinet office since 1858. In 1872 his health failed, and he visited Europe, without, however, resigning his office of minister of militia.

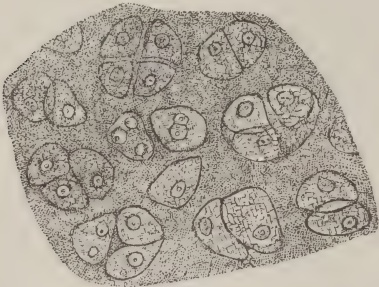
CARTIER, Jacques, a French navigator, born at Saint Malo, Dec. 31, 1494, died about 1555. Under the auspices of Francis I., he was intrusted with the command of an expedition to explore the western hemisphere. He sailed from Saint Malo, April 20, 1534, with two ships of 60 tons each, and a crew of 120 men, and in 20 days reached the E. coast of Newfoundland; thence steering N. he entered the straits of Belle Isle, and took possession of the coast of Labrador by planting a cross. He next turned S. and followed the W. coast of Newfoundland to Cape Ray, when he was borne W. by unfavorable weather toward the Magdalen islands. After visiting them, he continued W., landed at the mouth of the Miramichi, whence he went with some of his men to explore the bay of Chaleurs, and a few days later sailed with his two ships, to land again a little further N. in the bay of Gaspé, which he mistook for the outlet of a large river. He there had friendly intercourse with the savages, and inspired them with such confidence that one of their chiefs permitted two of his sons to go with him to France, on condition that he would bring them back the following year. There he planted another wooden cross, to which was attached a shield bearing the arms of his king, and the words, *Vive le roi de France!* He next proceeded N. E., doubled the E. point of Anticosti, and entering the channel which separates the island from the continent, sailed up that branch of the St. Lawrence to Mont Joly, not being aware, however, of the existence of the river. Returning, he reached Saint Malo, Sept. 5, 1534, after an absence of less than six months. This successful voyage encouraged the king to new efforts; three well furnished ships were fitted out for another expedition, which was joined by some of the young nobility of France, and Cartier was appointed commander, being designated in the commission as "captain and pilot of the king." About the middle of May, 1535, Cartier assembled his companions and men on Whit-Sunday, and repaired to the cathedral, where a solemn mass was celebrated, at which the whole company received the eucharist and the bishop's blessing. The squadron, consisting of La Grande Hermine, a vessel of 120 tons, La Petite Hermine, of 60, and L'Emérillon, a smaller craft, sailed May 19, carrying several young gentlemen as volunteers, and two chaplains. Storms soon separated the three vessels, which after a rough voyage arrived successively at their place of rendezvous, the inlet of Blanc Sablon, in the straits of Belle

Isle. On July 31 they sailed W. and entered the channel between the mainland and Anticosti, which he called Île de l'Assomption; sailed up the river St. Lawrence; saw the mouth of the Saguenay Sept. 1; and on the 14th came to the entrance of a river at Quebec, now called the St. Charles, to which he gave the name of Sainte Croix. The next day he was visited by Donnacona, of Stadaconé, *agouhanna* or king of Canada, with whom he was enabled to converse, the two Indians whom he had the previous year taken from Gaspé to France acting as interpreters. Leaving his two larger ships safely moored, he sailed in the *Emérillon* up the stream as far as Lake St. Peter; there, his further progress being interrupted by a bar in the river, he took to his boat with three volunteers, and on Oct. 2 arrived at an Indian settlement called Hochelaga, which he called Mont Royal, whence the present name Montreal. On the 5th he left Hochelaga and rejoined his ships at the mouth of the Sainte Croix, where he passed the winter. With his men he suffered from the severity of the climate, but above all from the scurvy, which made frightful ravages among them; no fewer than 25 soon died; and out of 110 still surviving in February, 1536, only a few were free from the disease. Owing to the reduction of their number, Cartier decided to abandon one vessel, apparently the *Petite Hermine*. After having taken solemn possession of the land in the name of Francis I., by erecting a cross bearing the arms of France, with the inscription, *Franciscus primus, Dei gratia Francorum rex, regnat*, he sailed May 6, carrying with him Donnacona and nine other chiefs whom he had somewhat treacherously kidnapped; went through the channel S. of Anticosti, and the straits S. of Newfoundland, and once more reached Saint Malo, July 16, 1536. The hardships which had been incurred during the expedition were not encouraging to colonization; but at last the entreaties of François de la Roque, lord of Roberval in Picardy, prevailed; he was appointed viceroy and lieutenant general of the new territories, while Cartier preserved the title of captain general and chief pilot of the king's ships. Five vessels were now fitted out; Cartier sailed with two of them, May 23, 1541; he was soon joined by the three others, and they arrived at Sainte Croix Aug. 23. On exploring the neighboring country, Cartier found a better harbor at the mouth of the Cap Rouge river, where he built a fort called Charlesbourg Royal. Here he anchored three of his ships, while the two others returned to France after landing their cargoes. Cartier then visited Hochelaga for the second time, with the particular purpose of ascertaining the obstructions to further navigation. The winter passed in gloom. Toward the end of May, 1542, nothing having been heard from Roberval, provisions becoming scarce, and the savages evincing unfavorable feelings, Cartier sailed for France. On his

way he met Roberval; but he continued, steering for France, where he arrived without any further accident. In the autumn of 1543 he made his fourth voyage to Canada, sent by the king to bring back Roberval, who had wintered at Charlesbourg Royal or France Roi, as he called it. Cartier wintered in Canada, and finally left it about May, 1544. From that time he lived quietly, either at Saint Malo or at the village of Limoilon; the precise date of his death is unknown. A brief but interesting account of his second expedition appeared anonymously in 1545. The journals of the first two journeys of Cartier are inserted in vol. iii. of Ramusio's Italian collection (Venice, 1565); also abridged in Marc Lescarbot's *Histoire de la Nouvelle France*; a French translation of Ramusio's account of the first voyage was printed at Rouen in 1598, and reprinted in 1865; and the journals appeared in the original French in 1867. A description of his third journey is in vol. iii. of Hakluyt's "Principal Navigations," &c. (1600). The whole series have been collected by the Quebec historical society.

CARTILAGE, a firm, elastic substance, of an apparently homogeneous structure, bearing some analogy to bone, and entering largely into the composition of the animal skeleton; in its intimate structure it approaches very closely the cellular tissues of vegetables. It constitutes the rudimentary skeleton of the higher mollusca, and of the selachian fishes, hence called cartilaginous fishes; in man and the higher animals it forms the internal skeleton at the early periods of life, and is in all employed as a nidus for the development of bone. The organic basis of cartilage is a variety of gelatine called chondrine; this, like gelatine, in a watery solution solidifies on cooling, and may be precipitated by alcohol, creosote, tannic acid, and corrosive sublimate, and is not precipitable with ferrocyanide of potassium; but, unlike gelatine, it is precipitable with acetic and the mineral and other acids, with alum, persulphate of iron, and acetate of lead. True cartilage is of a white or bluish white appearance; fibro-cartilage is of a yellowish color, and exhibits a fibrous structure. Temporary cartilages supply the place of bone in early life, and gradually become ossified; for a considerable time after birth the ends of the long bones are composed chiefly of cartilage, and the extremities are not united to the shafts by bone until about the 20th year. Permanent cartilages are divided into two kinds, the articular and the membraniform; the skeleton of the selachians is also permanent cartilage. Articular cartilages cover the ends of bones entering into the formation of joints, either a thin layer between almost immovable bones, as those of the cranium, ilium, and sacrum, or incrusting the ends in the free-moving ball-and-socket and hinge joints. The membraniform cartilages have no relation to locomotion, but serve to keep open canals or passages by the mere force of their elasticity; such are the cartilages of the external ear, nose, edge of the

eyelids, Eustachian tube, and the air passages. The distinguishing characters of cartilage are elasticity, flexibility, and cohesive power; it is not easily broken, and will speedily resume its proper shape when bent by accident or design. These varieties of cartilage, except the articular, are covered with a fibrous perichondrium, analogous to the periosteum of bones, which serve as support to the blood vessels. The simplest form of cartilage consists of nucleated cells, large, ovoid, more or less flattened by their mutual contact; the diminutive nucleus, attached to the cell wall, contains a minute nucleolus; these cells are scattered irregularly in an intercellular substance, or hyaline matrix, which contains numerous granules, many of which, according to Hassall, must be regarded as the cytoblasts from which new cells are developed; the amount of this substance is greatest in the



Homogeneous Substance and Cells of Cartilage.

fully developed cartilage. In the condensed margin of true cartilage, the cells are compressed, with their long diameters parallel to the surface they cover; when ossification begins in temporary cartilage, the cells become disposed in rows, as described in the article BONE. In the articular cartilages the cells are arranged in small groups in an abundant hyaline matrix; they measure from $\frac{1}{1300}$ to $\frac{1}{500}$ of an inch; in their deep portions these cartilages gradually blend with the bone, which dips unevenly into the substance of the cartilage. In the cartilages of the ribs the cells are larger than in any other, being from $\frac{1}{800}$ to $\frac{1}{400}$ of an inch in diameter; they often have a linear arrangement, and are imbedded in a very abundant intercellular substance, which sometimes presents a distinctly fibrous structure, though not resembling white fibrous tissues. In the membraniform cartilages, the cells are very numerous in proportion to the intercellular substance, which is so fibrous in its character in the external ear as to approach very near to fibro-cartilage; the ear of the mouse is a good specimen of this form, and presents in its central portion a series of six-sided cells arranged in layers one above the other, resembling, except in size, the transverse section of the pith of a plant. Cartilage is sometimes found as an accidental and diseased product. *Enchondroma* is a tu-

mor attached to bone, containing cells like those of cartilage, and others of a peculiar form resembling the lacunæ of bone. In the articulations, especially in the knee joint, loose rounded bodies are often found, of a cartilaginous consistence, frequently as large as the knee pan; these interfere with the motions of joints, and are sometimes removed by operation. The cartilage cells of reptiles are larger than those of fishes, being largest in the siren; in birds cartilage is very early converted into bone, so that they have very little of it except in the joints; the largest cells in the mammals, according to Mr. Quekett, are found in the elephant. Cartilage belongs to non-vascular substances, as considerable masses are found unpenetrated by a single vessel; articular cartilage is non-vascular, except in some diseased conditions when the presence of a few vessels seems to have been detected; temporary cartilage also, when in small mass, has no vessels, but when of considerable thickness the delicate extensions of the investing perichondrium penetrate it in a tortuous manner; the membraniform resemble the temporary cartilages in respect to vascularity. The nutriment of articular cartilage is derived from the vessels of the joint, and from the synovial membrane, though none of these enter its substance, the nutrient material passing from cell to cell by imbibition; in cartilages of ossification vessels regularly appear, accompanying the process of bone formation. According to Hassall, cartilage cells are multiplied in two ways: 1, by the division of a single cell into two or more parts, each becoming a distinct cell; 2, by the development of cytoblasts in the intercellular substance, or in the parent cells, constituting a true reproduction, constantly going on. In this multiplication by division, and by development of secondary in parent cells, cartilages resemble the *algæ*, and herein they stand alone in the animal economy. Cartilage cannot be regenerated; fractured surfaces are united only by a condensed cellular tissue.—There is a form of tissue which may be described here, as it differs from cartilage chiefly in having its intercellular substance replaced by white fibrous tissue; it is therefore called fibro-cartilage. It occurs principally in the joints, where its strength and elasticity are most needed. Its color is white, slightly tinged with yellow, with the shining fibres of the white fibrous tissue quite conspicuous; its consistence varies from pulpy to very dense. The fibres are arranged in an intricate and interlaced manner, strongest in that direction in which the greatest toughness is required. To the strength of fibrous tissue is added the elasticity of cartilage; its vessels are few and derived from adjacent textures, and no nerves have been detected in it; its sensibility is low, and it has no vital contractility. The disks between the vertebræ are fibro-cartilage; their elasticity diminishes the shocks to which the spinal column is necessarily subjected; in the whale

these disks are very large, detached from the vertebral bodies, and more or less ossified. In the diarthrodial joints, as in the sterno-clavicular, temporo-maxillary, and knee joints, there are fibrous laminae, free on both surfaces, called *menisci*; in these the circumference is fibro-cartilage, and the centre more cartilaginous. On the edges of the shoulder and hip joints is a rim of fibro-cartilage, giving depth to the articular cavities. In the grooves in bone for the lodgment of tendons we find another instance of the occurrence of fibro-cartilage. Fibro-cartilage is not so prone to ossification as the simple fibrous structures; it is repaired by a new substance of similar texture; in cases of false joint from the non-union of fractured bone, the broken ends are sometimes connected by fibro-cartilage. The pubic bones at the symphysis are united by this tissue. Fibro-cartilage is less soluble in boiling water than true cartilage, and yields therefore less chondrine.—The uses of cartilage and fibro-cartilage are entirely of a mechanical nature; their structure is admirably adapted for the protection of organs by their solidity, flexibility, and elasticity.

CARTOUCHE, Louis Dominique, a French robber, born in Paris about 1693, executed Nov. 28, 1721. He organized a band of desperadoes, whose robberies and murders spread terror among the Parisians. For years, notwithstanding a high price had been put on his head, he baffled the police, and was arrested by mere chance in a cabaret. His trial, which lasted for several months, created a deep sensation; and an immense crowd gathered to witness his execution. He was broken on the wheel alive; but to the last moment the public and himself were under the impression that he would be rescued by his companions.

CARTWRIGHT, Edmund, an English clergyman, inventor of the power loom, born at Marnham, Nottinghamshire, April 24, 1743, died Oct. 30, 1823. He was educated at Oxford, was elected a fellow of Magdalen college, and was rector of Brampton, Derbyshire, and afterward of Goadby Marwood, Leicestershire. His early life was passed in lettered ease, and was especially devoted to poetical composition. During the summer of 1784, happening to be at Matlock, he had a conversation with some gentlemen from Manchester on the subject of mechanical weaving. He had never till now, in his 40th year, taken any interest in mechanics, but by April of the succeeding year he had his first power loom in running order. The invention was opposed equally by spinners and their workmen. The latter class saw in it a machine that would deprive them of bread; the other feared it was a device that would diminish their profits. A mob set fire to the first factory and burned it with 500 spindles. Improvements were added to the original machine, and it slowly made its way. For many years, however, Cartwright derived no pecuniary benefit from his invention. He patented

several other machines, of which the principal was one for wool combing. Numerous societies awarded him premiums, but he received no substantial benefits from any of his inventions till 1809, when, on the memorial of the principal cotton spinners, parliament voted him £10,000. This sum placed him in easy circumstances, and he devoted his time to experiments in the adaptation of steam power to boats and carriages, but died without attaining any important result.

CARTWRIGHT, John, an English political reformer, elder brother of the preceding, born at Marnham in 1740, died Sept. 23, 1824. At the age of 18 he entered the navy, but at 35 was still a lieutenant. Meantime the struggle between Britain and her colonies enlisted his sympathies for the Americans. In 1774 he published his "Letters on American Independence," and at the same time requested to be placed on the retired list, rather than fight against the colonists. Lord Howe vainly attempted to shake his resolution in this respect. Having retired to Nottinghamshire, where he possessed some property, he received a commission as major in the militia. His appointment gave great offence to the government, who signified their disapprobation so pointedly to the lord lieutenant that he refused Cartwright the usual step of promotion to the lieutenant-colonelcy, although five successive vacancies occurred in that office. He retired from the regiment in 1792, and about this time removed to Lincolnshire. His name now becomes prominent in the history of parliamentary reform. He contended for annual parliaments and universal suffrage. These he supported with voice and pen, in coöperation with Dr. Jebb, Granville Sharpe, Horne Tooke, Hardy, Thelwall, Cobbett, Hunt, and other liberals of the day. Mainly through his instrumentality the citizens of Birmingham were induced to elect a delegate claiming a seat in parliament under the name of their legislative attorney, although that city, the third in the kingdom, had no representation in that body. For his share in this proceeding Cartwright was tried in 1820 on a charge of sedition, and fined £100. Again, when procuring signatures in Huddersfield to a mammoth petition, he was arrested on a charge of exciting a riot, but released. The English liberals placed much reliance in the integrity of his purposes. Sir William Jones declared that his declaration of the people's rights should be written in letters of gold. Fox, in his place in parliament, said that few men united so complete a knowledge of the people's constitutional rights with such high intelligence and such conscientious views. His views on the American revolution were summed up in this sentence: "The liberty of man is not derived from charters but from God, and is original in every man." He was one of the earliest who maintained that the slave trade was piracy. In 1831 a bronze statue of him was erected in

Burton crescent, London. His life was published by his niece (2 vols. 8vo, London, 1826).

CARTWRIGHT, Peter, an American clergyman, born in Amherst co., Va., Sept. 1, 1785, died near Pleasant Plains, Sangamon co., Ill., Sept. 25, 1872. His parents removed in his childhood to Kentucky, where about 1801 his religious zeal was aroused by an itinerant preacher, and he joined the Methodist Episcopal church. He was ordained as deacon in 1806, and as elder in 1808, and preached for many years to the backwoodsmen, upon whom his homely but forcible and earnest utterances produced a deep impression. In 1812 he was appointed a presiding elder, spent eight years in the old Wesleyan conference, four in the Kentucky, eight in the Tennessee, and over 45 years in the Illinois conference. He was a member of every quadrennial conference from 1816 to 1860, and again in 1868. He travelled 11 circuits and 12 presiding elders' districts; received more than 10,000 members into the church, baptized more than 12,000 persons, pronounced on an average four discourses a week for 33 years, and preached in all about 15,000 sermons. His "Fifty Years a Presiding Elder," and the "Autobiography of Peter Cartwright, the Backwoods Preacher," edited by the Rev. W. P. Strickland (New York, 1856), furnish vivid pictures of the life of a frontier preacher.

CARTWRIGHT, Thomas, an English Puritan divine, born in Hertfordshire about 1535, died Dec. 27, 1603. He studied divinity at St. John's college, Cambridge; but afterward he turned his attention to the legal profession, and became clerk to a counsellor at law. Eventually, however, he returned to the university, and was chosen fellow of St. John's in 1560. He was appointed Lady Margaret's reader of divinity in 1570, and provoked the hostility of Sir William Cecil and Dr. Whitgift by the constancy with which he advocated the Puritan doctrines and discipline. In 1571, when the latter became vice chancellor of the university, he was deprived of his professorship, and in the following year of his fellowship. He then repaired to the continent, and was chosen minister to the English merchants at Antwerp and Middelburg. At the end of two years he returned to England, and published a second admonition to parliament in behalf of the Puritans. A protracted controversy with Whitgift, afterward archbishop of Canterbury, was the result of his publication, and Cartwright had again to expatriate himself, officiating while abroad as minister to English communities. In 1580 James VI. of Scotland offered him a professorship in the university of St. Andrews, which he declined. He was imprisoned on his return in 1582, but was released through the influence of Burleigh and Leicester, the latter making him master of the hospital which he had founded at Warwick. He was again committed to prison in 1585 and 1591, and in 1592 was reinstated in his mastership of the Warwick hospital, and was

again permitted to preach. His "Confutation of the Rhemish Translation, Glosses, and Annotations on the New Testament" was published after his death, in 1618. He was also the author of several commentaries on the Bible and of other works.

CARÚPANO, a maritime town of Venezuela, in the state of Cumaná, 260 m. E. of Carácas; lat. 10° 40' N., lon. 63° 22' W.; pop. of the town and canton about 10,000. It is charmingly situated near the base of high hills commanding an extensive view of the surrounding country, much of which is covered with forests and marshes. There are a church, a grammar and a primary school, and some parochial charitable institutions. The climate is hot, and generally insalubrious owing to the prevailing moisture and the exhalations from the marshes. The principal employments of the inhabitants are agriculture and the raising of horses and mules, numbers of which are exported, as are also fruits and other tropical productions. The port is commodious, and is defended by a battery situated on an eminence.

CARUS, Karl Gustav, a German physician and naturalist, born in Leipsic, Jan. 3, 1789, died in Dresden, July 28, 1869. After studying in the gymnasium and university of his native place, he devoted himself to chemistry, in order to aid his father, who was a dyer. He soon left chemistry, and in 1811 graduated at Leipsic as a physician. Engaged as teacher in the university, he was the first to deliver there a distinct course of lectures on comparative anatomy. In 1813 he was appointed to the French hospital at Pfaffendorf, near Leipsic, and by his devotion to his patients contracted a severe illness. The following year, on the reorganization of the medico-chirurgical academy of Dresden, he was appointed professor of midwifery, and at the same time had the clinical direction of the lying-in hospital. In 1827 he resigned his professorship on being appointed physician to the king of Saxony. He continued, however, to lecture, and in 1827 delivered a course of lectures on anthropology, and in 1829 on psychology, which added greatly to his previous reputation. Besides his professional and scientific labors, Carus was a painter of marked talent. His reputation rests mainly on his discovery of the circulation of the blood in insects, for which he received a prize from the French academy of sciences, and his contributions to the history of development in animals. His principal works are: *Versuch einer Darstellung des Nervensystems, und insbesondere des Gehirns* (Leipsic, 1814); *Lehrbuch der Zootomie*, with 20 plates engraved by himself (1818); *Erläuterungstafeln zur vergleichenden Anatomie* (3 vols., 1826-'35); *Ueber den Blutkreislauf der Insecten* (1827); *Grundzüge der vergleichenden Anatomie und Physiologie* (3 vols., Dresden, 1828); *Vorlesungen über Psychologie* (Leipsic, 1831); *Briefe über Landschaftsmalerei* (1831); *Symbolik der menschlichen Gestalt* (1852); *Erfahrungsergebnisse aus*

ärztlichen Studien und ärztlichem Wirken während eines halben Jahrhunderts (1859); *Natur und Idee, oder das Werden und sein Gesetz* (Vienna, 1861); and *Lebenserinnerungen und Denkwürdigkeiten* (4 vols., Leipzig, 1865-'6).

CARUS, Marcus Aurelius, a Roman emperor, born at Narbo (Narbonne) in Gaul (according to other authorities, at Milan or in Illyria), about A. D. 222, died in 283. His descent is doubtful, but it is supposed that his father was an African, and his mother a noble Roman lady. He was educated in Rome, attained the highest military and civil offices, was prætorian prefect, and was proclaimed emperor by the legions, on the assassination of Probus, in 282. He caused justice to be executed upon the assassins. He gained a signal victory over the Sarmatians, and prosecuted the war against the Persians. Undertaking the campaign in midwinter, and making a rapid march through Thrace and Asia Minor, he ravaged Mesopotamia, made himself master of Seleucia, and carried his arms beyond the Tigris, where he died suddenly in his camp, according to some killed by a stroke of lightning.

CARUS, Victor Julius, a German zoölogist, born in Leipsic, Aug. 25, 1823. He is the grandson of Friedrich August Carus (1770-1807), who was a professor and author of six posthumous volumes on philosophy (1808-'10). His father, Ernst August Carus (1795-1854), was for many years professor of surgery at Dorpat, and author of a handbook of surgery (1838). Victor was educated at the university of Leipsic, became assistant physician there, and in 1849 was appointed director of the museum of comparative anatomy at Oxford. He returned to Leipsic in 1851, and has been since 1853 professor of comparative anatomy and director of the zoötomical collection in that university. He has published *System der thierischen Morphologie* (1853); *Icones Zootomicæ* (1857 *et seq.*); with Engelmann, *Bibliotheca Zoologica* (2 vols., 1862); with Gerstäcker, *Handbuch der Zoologie* (1868 *et seq.*); and *Geschichte der Zoologie bis auf Johannes Müller und Charles Darwin* (Munich, 1872).

CARVAJAL, Tomas José Gonzales, a Spanish author, born in Seville, Dec. 21, 1753, died Nov. 9, 1834. He was appointed in 1795 governor of the new colonies in Sierra Morena and Andalusia; protested against the French invasion of Spain in 1808; from 1809 to 1811 served as commissary in the Spanish army against Napoleon; in 1813 became minister of finance; relinquished these offices to assume the directorship of the royal university of Isidro; was arrested and detained in prison from 1815 to 1820, and exiled from 1823 to 1827. At the time of his death he was member of the supreme council of war, of the military department of the Spanish and Indian boards, and a grandee of Spain. He learned Hebrew at the age of 57, in order to translate the Psalms. He published *Los Salmos* (5 vols., Valencia, 1819), and *Los libros poeticos de la Santa Bi-*

blia (6 vols., Valencia, 1827). His *Opusculos ineditos en prosa y en verso* appeared after his death (13 vols., Madrid, 1847).

CARVALHO E MELLO. See POMBAL.

CARVER, a S. E. county of Minnesota, bounded S. E. by the Minnesota river, and intersected by Crow river; area, 375 sq. m.; pop. in 1870, 11,586. The surface is undulating, the soil fertile, and it is watered by numerous lakes and streams. There is a railroad from Minneapolis to Chaska, and the proposed Hastings and Dakota railroad will pass through it. The chief productions in 1870 were 298,852 bushels of wheat, 122,140 of Indian corn, 140,375 of oats, 33,987 of barley, 54,207 of potatoes, 19,694 tons of hay, 211,497 lbs. of butter, and 16,313 of wool. There were 1,691 horses, 4,170 milch cows, 8,381 other cattle, 5,501 sheep, and 7,874 swine. Capital, Chaska.

CARVER, John, first governor of Plymouth colony, born in England, died at Plymouth, Mass., in April, 1621. He left his country for the sake of religion, and established himself at Leyden, whence he was sent to effect a treaty with the Virginia company concerning territory in North America. He obtained a patent in 1619, and proceeded in the Mayflower with 101 colonists. After a dangerous voyage they arrived at Plymouth, where Carver was unanimously elected governor. He managed the affairs of the infant colony with prudence, and exhibited great address in his intercourse with the Indians, but died within four months after landing, his wife surviving him only six weeks.

CARVER, Jonathan, an American traveller, born at Stillwater, N. Y., in 1732, died in London, Jan. 31, 1780. He abandoned the study of medicine for a military life, bought an ensigncy, became a captain, and served in the war by which the Canadas came into the possession of Great Britain. At the conclusion of peace in 1763 he undertook to explore the interior of North America, and to open new channels of commerce. He penetrated to the Minnesota river, and returned to Boston in 1768. Proceeding to England, he unsuccessfully solicited from the king requital of his expenses, and aid in publishing his charts and journals. He was even commanded to deliver up his papers, now ready for publication, as being the property of the government, and was obliged to repurchase them from the bookseller to whom he had sold them. In 1778 he published "Travels through the Interior Parts of North America," and in 1779 a "Treatise on the Culture of the Tobacco Plant."

CARVIN, a town of France, in the department of Pas-de-Calais, 15 m. N. E. of Arras; pop. in 1866, 6,546. It has starch and sugar factories, and distilleries.

CARY. I. Alice, an American author, born in the Miami valley, 8 m. N. of Cincinnati, Ohio; April 26, 1820, died in New York, Feb. 12, 1871. Her parents were people of considerable culture, but she had only the slight advantages of education afforded by a newly settled country.

She began writing verses at the age of 18 years, and for the next ten years made frequent contributions in prose and verse to newspapers and magazines. She first attracted attention by some sketches of rural life published in the "National Era," under the signature "Patty Lee." The "Poems of Alice and Phœbe Cary," of which about one third were written by the latter, appeared in Philadelphia in 1849. In 1850 the two sisters removed to New York, where they devoted themselves with industry and success to literary labor. Alice became a constant contributor to the leading literary periodicals of the country, and her articles, both prose and poetry, were subsequently collected in volumes which were warmly welcomed both at home and abroad. She also wrote novels and poems which made their first appearance in book form. Her poems are characterized by a rare naturalness and grace, while her prose is remarkable for its realistic character and charming descriptions of domestic life. Her last illness was protracted and attended with much suffering, but was borne with patience and cheerfulness. Alice Cary's published works, besides the volume above mentioned, are: "Clovernook Papers," in two series (1851 and 1853), and "The Clovernook Children" (1854), containing sketches of western life and scenery; "Hagar, a Story of To-day" (1852); "Lyra and other Poems" (1853; enlarged ed., including "The Maiden of Tlascalala," 1855); "Married, not Mated" (1856); "Pictures of Country Life" (1859); "Lyrics and Hymns" (1866); "The Bishop's Son" (1867); "The Lover's Diary" (1867); and "Snow Berries, a Book for Young Folks" (1869). **II. Phœbe**, an American poetess, sister of the preceding, born near Cincinnati, Sept. 4, 1824, died at Newport, R. I., July 31, 1871. She contributed frequently to periodicals, but her writings were chiefly poems very different in style from those of her sister, being more buoyant in tone and more independent in manner. One of her earliest poems, "Near Home," written in 1842, attracted very general attention. Her household duties while living in New York with her sister interfered somewhat with her literary labor. Her published works, besides the contributions to the volume issued in conjunction with her sister, were: "Poems and Parodies" (1854); "Poems of Faith, Hope, and Love" (1868); and a large portion of the "Hymns for all Christians," compiled by the Rev. Dr. Deems in 1869. She wrote a very beautiful and touching tribute to her sister's memory, which was published in the "Lady's Repository" a few days before her own death.—See "Memorial of Alice and Phœbe Cary, with some of their Later Poems," by Mary Clemmer Ames (New York, 1873).

CARY, Archibald, an American patriot, born in Virginia about 1730, died there in September, 1786. His family was descended from Henry Lord Hunsdon, and at the time of his death he was the heir apparent of the barony. He

early became a member of the house of burgesses. In 1764 he served on the committee which reported the address to the king, lords, and commons, on the principles of taxation; and in 1770 was one of the signers of the "mercantile association," pledged to use no British fabrics thereafter, the design being to resist by practical measures the encroachments of the government. In 1773 he was one of the committee of correspondence by which the colonies were united against parliament; in the following year he was a member of the convention which appointed delegates to the general congress; and he served with great distinction in the convention of 1776. As chairman of the committee of the whole he reported the resolutions instructing the Virginia delegates in congress to propose independence. When the state government was organized he was returned to the senate, of which he was chosen president. At this time occurred the incident with which his name is most generally connected. The scheme of a dictatorship had been broached, and without his knowledge or consent Patrick Henry was spoken of for the post. In the midst of the general agitation Cary met Mr. Syme, Mr. Henry's half-brother, in the lobby of the assembly, and said to him: "Sir, I am told that your brother wishes to be dictator. Tell him from me that the day of his appointment shall be the day of his death, for he shall find my dagger in his heart before the sunset of that day." The project was speedily abandoned. Cary soon afterward retired to his estate of Amptill, in Chesterfield co., where he died. He was a good representative of the former race of Virginia planters, delighting in agricultural pursuits, in blooded horses, and improved breeds of cattle. He was a man of singular courage, and was called by his contemporaries "Old Iron."

CARY, Henry Francis, an English clergyman and writer, born in Birmingham, Dec. 6, 1772, died in London, Aug. 14, 1844. He early distinguished himself by an "Ode to Kosciusko" and a volume of odes and sonnets. At Oxford he devoted himself to the study of the modern European languages. In 1797 he was appointed vicar of Bromley Abbot's. His translation into blank verse of the *Divina Commedia* of Dante (1806-'14) gained him great celebrity. He also translated the "Birds" of Aristophanes, and some odes of Pindar. His continuation of Johnson's "Lives of the English Poets" from Johnson to Kirke White, and his "Lives of the early French Poets," are meritorious productions; the latter were published anonymously in the "London Magazine" and in a volume edited by his son, the Rev. Henry Cary, in 1846. From 1826 to 1832 he was assistant librarian of the British museum, and received a government pension of £200. He edited editions of Pope, Cowper, Milton, Thomson, and Young. He was buried in Westminster abbey, and his memoirs, by his son, with his literary journal and letters, were published in 1847.

CARY, Lott, one of the founders of Liberia, born a slave near Richmond, Va., in 1780, died at Monrovia, Africa, Nov. 8, 1828. In his youth he was vicious and profane, but in his 27th year he joined the Baptist church. With the change in his character came the thirst for knowledge. He soon learned to read and write, and after a time he began to preach to his countrymen. He succeeded in raising by extra work \$850, with which he redeemed himself and his two children from slavery. He was then employed in a tobacco warehouse with a good salary. In 1815 he became interested in Africa and in the establishment of missions there. In February, 1821, he went to Liberia, and was instrumental in the removal of the colonists from their first unhealthy position to Cape Mesurado, now Monrovia. He exerted himself in the erection of cabins for the settlers, felling trees, prescribing for the sick, preaching, or fighting against the savages, who had determined to exterminate the colonists. Once, when the latter had become dissatisfied with the course of the colonization society in regard to the tenure of their lands, he took sides with them against the agent, Jehudi Ashmun, although personally his friend; but foreseeing the evils which would follow insubordination, he acknowledged his error and submitted to the laws of the society. In September, 1826, Mr. Ashmun sailed for America, leaving the entire control of the colony in the hands of Mr. Cary. He was killed by the explosion of a cask of powder in a building where he was making preparations to repel an assault of the natives.

CARYATIDES, in architecture, female figures which support a roof in lieu of columns or pilasters. Vitruvius says that the inhabitants of Caryæ, an Arcadian village, joined the Persians after the battle of Thermopylæ; after the defeat of the Persians the confederate Greeks destroyed Caryæ, put the male inhabitants to death, and enslaved the women. Sculptors, in commemoration of their infamy, made use of representations of these women to sustain roofs and heavy superincumbent weights; but the use of caryatides is more ancient than the date of the story, and the Greeks probably derived this form in architecture from Egypt.



CASA, Giovanni della, an Italian prelate and author, born near Florence, June 28, 1503, died in Rome, Nov. 14, 1556. He was of a distinguished family, studied in Bologna and Padua, and led a gay life in Rome; but becoming a priest in 1538, he was employed in 1541 on a papal mission to Florence, and elected to the newly founded *accademia fiorentina*. In 1544 he became archbishop of Benevento, and was subsequently nuncio at Venice until after the death of Pope Paul III. (November, 1549). The new pope, Julius III., being unfriendly to him, sold the post of clerk of the camera, which

he had held for seven years. He returned to Venice, remaining there till after the accession of Paul IV. (1555), when his hopes of becoming a cardinal were frustrated partly by his promotion being urged by France, and probably still more by the existence of his licentious poem *Capitoli del forno*. He did not long survive this disappointment. In point of style he was the best Italian prose writer of his day. His most celebrated work, *Galateo*, briefly laying down the rules of polite behavior and illustrating the manners of society, has been translated into foreign languages and passed through many additions. His writings in Latin include translations from Plato and Aristotle. His lyrical poems, edited by Ménage (Paris, 1667), are noted for their purity and delicacy. His licentious poem *Capitoli* (Venice, 1538-'64), has been expunged from the several editions of his complete works (3 vols., Florence, 1752; 4 vols., Milan, 1806).

CASABIANCA, Louis, a French naval officer, born at Bastia about 1755, died Aug. 1, 1798. He entered the naval service when very young, and having adopted the principles of the French revolution, he was elected to the national convention; on the trial of Louis XVI. he did not vote for death, but merely for imprisonment. He subsequently became a member of the council of 500; after which he was appointed captain of L'Orient, the flag ship of Admiral Brueys, the commander of the fleet which took Bonaparte and his army to Egypt. When this fleet was attacked by the English in the bay of Aboukir, Casabianca fought bravely to the last, and was killed with his son, then 10 years old, by the explosion of his ship.

CASACALENDA, a town of S. Italy, in the province and 18 m. N. E. of Campobasso; pop. about 6,000. It contains several churches, one of which is noted for its Tuscan architecture, and a convent. Wine and excellent fruit are largely produced in the surrounding country, and silkworms are reared. Some authorities identify its site with that of the ancient Calela, in the territory of Larinum, where, according to Polybius, Minucius was encamped at a distance of about 16 stadia from the headquarters of Hannibal at Gerunium.

CASAL, or Casal, Mannel Ayres de, a Portuguese geographer, born in the latter half of the 18th century, died at Lisbon in the second quarter of the present century. Having received an excellent education, he took holy orders, but afterward devoted himself to the exploration of Brazil. He has been styled the father of Brazilian geography, and his principal work, entitled *Corografia Brasileira* (2 vols., Rio de Janeiro, 1817), elicited the admiration of Humboldt and of other competent judges.

CASALE, a city of Italy, capital of a district in the province of Alessandria, on the right bank of the Po, 38 m. E. N. E. of Turin, near the site of the ancient Sedula; pop. in 1871, 25,714. The citadel, founded in 1590, was one of the strongest in Italy; and after the cam-

paign against Austria in 1849 the defences, which had fallen into decay, were rebuilt and enlarged. It was the capital of the ancient marquisate of Montferrat, and has sustained several sieges, and frequently changed its masters. It is the seat of a bishop and of a district court of justice, and has a cathedral, founded in 742, a theatre, and a royal college. The church of San Domenico, containing a tomb in memory of the princes Palæologi, is remarkable for the elegance of its design, and several fine works of art are found in other churches. Among the prominent articles of trade are silk, hemp, fruit, and wine.

CASAL-MAGGIORE, a town of Italy, on the Po, in the province and 22 m. S. E. of Cremona; pop. about 4,500. Tanneries, and the manufacture of glass, pottery, and cream of tartar, are carried on. The town has a superior school, a hospital, orphan asylum, and theatre. A victory was achieved here by Sforza over the Venetians in 1448.

CASAL-PUSTERLENGO, a town of Italy, in the province and 30 m. S. E. of Milan, on the Brembiolo; pop. about 5,500. It is the seat of several public offices, has a church and sanctuary, manufactures of silk, linen, and earthenware, and an extensive trade in cheese.

CASAMANZA, a river of Senegambia, rises in the mountains S. of Barraconda, and after a course of 200 m. falls into the Atlantic, about 56 m. S. of the Gambia. Its lower course has been since 1860 within French territory. The French fort of Carabane is situated at its mouth.

CASANOVA, *Giovanni Giacomo de Seingalt*, an Italian adventurer, born in Venice, April 2, 1725, died in Austria about 1803. His father, who was of noble descent, was an adventurer and comedian, and married the daughter of a Venetian shoemaker. Giovanni was sent to Padua, and placed under the instruction of Gozzi; but having been implicated in a brawl between the students and the police, he was forced to leave Padua, and went to Venice. His adventures there are described in his memoirs, and reveal the frivolous character of the Venetian society of those days. Having become notorious for his profligacy, he was finally thrown into the dungeon of San Andrea, but effected his escape, and, after wandering over various towns of Italy, succeeded in finding at Morterano a prelate to whom he brought letters of introduction which his mother had obtained for him, and who recommended him to his friends at Naples. They in turn supplied him with letters to Cardinal Acquaviva in Rome, who brought him into personal contact with Pope Benedict XIV., and this circle of acquaintance laid the foundation for his subsequent career. His devotion to the poetical Marchesa Gabrielli, his mental encounters with the literati, his conversational triumphs in the high social circles of Rome, were all brought to a sudden close by his connivance in an elopement which gave offence to the marchesa, who requested Cardinal Acquaviva to dismiss Casanova, whom

he employed as secretary. The cardinal gave him a passport for Venice, and he eventually reached Constantinople, in company with the Venetian ambassador, into whose favor he had insinuated himself. He was received with great distinction by Cardinal Acquaviva's friend, the pasha of Caramania, alias count de Bonneval, who introduced him to Yusuf Ali, whose wife fell in love with him, while his daughter Zelmi was offered to him in marriage. He left Constantinople surfeited with presents and money, which he lost in gambling soon after his arrival at Venice in 1745, where he accepted a humble musical employment in the orchestra of the theatre San Samuele, in order to save himself from starvation. Here he fell in with the rich Venetian senator Bragadio, but was soon again compelled to remove to other places in order to escape the hands of justice. After figuring as a magician at Cesena, as a priest at Milan, and in various characters at Mantua, Ferrara, Bologna, Parma, and Venice, he made his first appearance in Paris on June 1, 1750. There his reputation had preceded him, and he was received with great favor; the marshal de Richelieu became his bosom friend; the duchess de Chartres doted upon him. After two years in Paris he joined his mother, who was then performing at the theatre of Dresden, and subsequently proceeded to Vienna, where he was received with much favor. On his return to Venice, July 25, 1755, he was lodged in the dungeons of the council of ten. He gives in his memoirs an entertaining but improbable account of the skill and audacity which he displayed in again effecting his escape. Early in 1757 he reappeared in Paris, where the dungeon episode added considerably to his notoriety. He now tried his hand at politics and financiering, and proposed a lottery in order to restore the equilibrium of the French exchequer. A meeting was convened to deliberate on the subject, and D'Alembert in his capacity of mathematician was invited to attend it. Casanova's persuasive power convinced the most skeptical minds of the infallibility of his project; it was actually adopted, but he did not remain to observe its development, being sent as a kind of government spy to Dunkirk. On his return to Paris he met the famous adventurer, the count de St. Germain, whom he subsequently found installed at the Hague. After failing in his various industrial speculations at Paris, Casanova went to Holland under the auspices of the duke de Choiseul, to contract a loan for the French government, while St. Germain had received the same mission from the hands of Louis XV. himself. The two adventurers were well matched, but as they found the Dutch unwilling to advance any money, Casanova resumed his travels. At Roche, in Vaud, he paid his respects to Haller, and at Ferney to Voltaire. At London he met the chevalier d'Eon, and was introduced to George III., but, implicated in a

charge of forgery, left the English capital in a hurried manner. At Brunswick the prince of Prussia helped him out of a pecuniary difficulty. His rencontres with St. Germain continued to be frequent and amusing. At Sans Souci he had an audience of Frederick the Great; at St. Petersburg, of Catharine II. Prince Adam Czartoryski introduced him to the king of Poland. He returned to Vienna, but Maria Theresa would not receive him, and he departed for Spain. There his career forms a continued series of scandals and intrigues. In Barcelona he was put in prison, where he beguiled his time by writing *Confutazione della storia del governo veneto d'Amelot de la Housaye* (Amsterdam, 1769). After recovering his liberty, he betook himself in 1768 to Aix, where he met Cagliostro. But Casanova's roving career was now drawing to its close. At a dinner of the Venetian ambassador at Paris he had met Count Waldstein of Bohemia, a good-natured man, and to escape from the dangers of his precarious position, he accepted the office of librarian in the château of the Bohemian count, where he spent the remaining years of his life. Casanova wrote a work on Polish history, translated the Iliad into French verse (4 vols. 4to, Venice, 1778), and was the author of an account of his imprisonment, and various other writings, among which is *Icosameron, ou Histoire d'Édouard et d'Élisabeth*, a narrative of 80 years spent among the inhabitants of the interior of the globe (5 vols. 8vo, Prague, 1788-1800). But his literary fame rests upon his *Mémoires de ma vie jusqu'en 1797*, written during his residence in Bohemia (corrected ed., 8 vols. 8vo, Paris, 1830).

CASAS, Las. See LAS CASAS.

CASA SANTA. See LORETO.

CASAS GRANDES (Span., great houses), a town of about 4,000 inhabitants in Chihuahua, Mexico, on the Casas Grandes or San Miguel river, 35 m. S. of Llanos, which first became noted for ruined edifices, apparently relics of an aboriginal race. These ruins are found about half a mile from the modern town, partly on the declivity of a small hill, and partly on the plain at its foot. They consist chiefly of the remains of a large edifice, built entirely of adobe, or mud mixed with gravel and formed into blocks 22 in. thick and about 3 ft. long. No stone appears to have been used in them, although the similar structures found in Arizona are entirely built of stone. The outer walls are almost all prostrate, except at the corners, and were probably only one story high; the inner walls are much better preserved, varying in height from 5 to 50 ft., and being in some cases 5 ft. in thickness at the base. The central parts of these, like the exterior walls, have generally fallen, leaving the corners towering above the rest. The portions remaining erect seem to indicate an original height of from three to six stories, but they are so much washed away that it is impossible to discover where the beams were inserted. The door-

ways have the tapering form noticed in the ancient structures of Central America and Yucatan, and over them are circular openings in the partition walls. The stairways in Chihuahua were of wood, but in Arizona of stone. Clavigero, in his "History of Mexico," tells us that the building at Casas Grandes was erected by the Mexicans in their peregrination, and that it consisted "of three floors, with a terrace above them, and without any entrance to the lower floor. The door for entrance to the building is on the second floor, so that a scaling ladder is necessary." It is difficult to form a correct idea of the arrangement of such an edifice, but its main features seem to have been three large structures connected by ranges of corridors or low apartments, and enclosing several courtyards of various dimensions. The extent from N. to S. must have been 800 ft., and from E. to W. about 250 ft. A range of narrow rooms, lighted by circular



House at Tewah, Arizona.

openings near the top, and having pens or enclosures 3 or 4 ft. high in one corner, supposed to be granaries, extends along one of the main walls. Many of the apartments are very large, and some of the enclosures are too vast ever to have been covered by a roof. About 200 ft. W. of the main building are three mounds of loose stones, which may have been burial places; and 200 ft. W. of these are the remains of a building, one story high and 150 ft. square, consisting of a number of apartments ranged around a square court. For some distance S. the plain is covered with traces of similar buildings, the nature of which cannot now be determined; and for 20 leagues along the Casas Grandes and Llanos rivers are found artificial mounds from which have been dug up stone axes, corn-grinders, and various articles of pottery, such as pipes, jars, pitchers, &c., of a texture far superior to that made by the Mexicans of the present day, and generally ornamented with angular figures of blue, red,

brown, and black, on a red or white ground. The best specimens command a high price in Chihuahua and neighboring towns.—On the summit of a mountain, about 10 m. from the



Interior View.

Casas Grandes, are the remains of an ancient stone fortress, attributed to the same people who built the Casas Grandes, which was probably intended as a lookout.—On the Salinas and Gila rivers, in the country of the Pimo and Cocomaricopa Indians, and in Arizona, are ruins of like character and evidently identical origin, to which the same name is usually applied. The Indians call all such ruins “casas de Montezuma.” Of those on the Salinas little remains but shapeless heaps of rubbish, broken pottery, and the traces of several irrigating canals. On the Gila, however, there are three distinct buildings, all enclosed within a space of 150 yards. The largest measures 50 by 40 ft., and at a distance looks not unlike a square castle, with a tower rising from the centre. The southern wall is badly rent and crumbled, but the other three walls are nearly perfect; they are roughly plastered over on the outside, and hard-finished inside with a composition of adobe. The material of which they are constructed is the same as that used in the Casas Grandes of Chihuahua. The walls are perpendicular within, but their exterior face tapers in a curve toward the top. One of them is covered with rude figures. The ends of the beams, which denote by their charred appearance that the building was destroyed by fire, are deeply sunk in the walls, and show three stories now standing. The lower floor is divided into five apartments. There is an entrance on each of the four sides, but there are no windows except on the W. side, and no traces of an interior stairway. The other two buildings are much smaller, and one of them was perhaps merely a watch tower. Both are badly ruined. About 200 yards distant is a circular enclosure, from 80 to 100 yards in circumference, probably intended for cattle. For miles around the plain is strewn with fragments of pottery.—The origin of these ruins is a subject of doubt. They were seen nearly in their present state by the early explorers of the country, and the Indians then assigned them an age of no less than 500 years. Mr. Squier supposes them to have been the work of the aboriginal race of the Moquis.

Late explorations have shown that the whole of the wide region drained by the Gila and Colorado rivers, now for the most part arid and desolate, was once widely if not densely populated. On the cliffs bordering the Colorado, and on the shelves of its rocky banks, in places apparently inaccessible, are remains of considerable edifices. Throughout the country west of the Rio Grande are the outlines of buildings, discernible by the stones that supported adobe walls, which have now been washed away by rains, or have been disintegrated by time. The stone buildings of the existing Pueblo Indians do not, as far as plan is concerned, differ much from those of their ancestors. They are built around courts, and are generally about three stories high; the walls receding by stages, and access being gained only by the use of ladders. When these ladders are drawn in, the various sides present a perpendicular front to an enemy, and the building itself becomes a fortress. These features indicate that before the conquest the quiet, agricultural population of what is gener-



Moqui Town, near Tewah.

ally called New Mexico was subject to raids or incursions from the barbarous hordes roaming to the north and northeast, against whom their *casas* were probably an efficient protection. The strength of the walls of these structures was proved during the Mexican war, when it was found that they were impregnable to field artillery. To gain greater security, the ancients built on the high *mesas*, or terrestrial islands, that abound in the region they occupied (precisely as did the barons of Europe in the middle ages), whose level summits could only be reached by narrow and easily defensible passes, in many cases hewn in the rock. The remains of the buildings that crowned these natural fastnesses are conspicuous and interesting features in the wide region embraced between the Rio Grande on the east, the Gila on the south, and the Colorado on the west.

CASAUBON. I. Isaac, a Swiss theologian and critic, born in Geneva in February, 1559, died in London, July 1, 1614. He was the son of a French Protestant minister, studied at Lau-

sanne, and afterward at Geneva, where he became professor of Greek at the age of 23, holding the position for 14 years. Meanwhile he married the daughter of Henry Stephens, the celebrated French printer and publisher, by whom he had 20 children. In 1596 he became professor of Greek and belles-lettres in the university of Montpellier. Two years afterward, at the solicitation of Henry IV., he went to Paris to take a similar professorship in the university of France; but the jealousy of the Catholic party made the measure impolitic, and Henry finally appointed a Catholic to the chair, and made Casaubon royal librarian. At the conference of Fontainebleau, May 4, 1600, Henry constituted him one of the Protestant judges. The Catholics made strong efforts to win him to their side, and it was given out that he wavered in his faith. Chagrined that his Protestant reputation was thus impaired, Casaubon determined to leave France, and therefore, availing himself of the occasion of Henry's death to get leave of absence from the queen, he accompanied Sir Henry Wotton to England in October, 1610. He was received with distinction, made prebendary of Canterbury, and some say also of Westminster, and received a pension of £200, which he lived three years to enjoy. He was buried in Westminster abbey. He spoke Latin as well as he did his mother tongue, and was the most critical Greek scholar of his age. His works are numerous, mostly philological and critical, many of them being annotated editions of the classics, including Diogenes Laërtius, Aristotle, Theophrastus, and Suetonius. **II. Meric**, an English divine, son of the preceding, born at Geneva, Aug. 14, 1599, died in England, July 14, 1671. He accompanied his father to England, studied at Oxford, was appointed to the cure of Bleaden in 1624, and four years afterward was made prebendary of Canterbury and rector of Ickham. He received the degree of D. D. at Oxford in 1636. Through his attachment to the Stuarts he lost both property and preferments during the protectorate; and Cromwell made frequent efforts to win him over to the cause of the commonwealth. Christina, queen of Sweden, offered him the superintendency of all the Swedish universities, but he persisted in living in retirement in England until the accession of Charles II., when his ecclesiastical preferments were all restored. He published in his lifetime two vindications of his father from the aspersions of his enemies. His theological and critical works are numerous; he edited some of the classics; and his MSS. are preserved in Oxford. He believed in the existence of witches and familiar spirits, a faith which he endeavored to defend in a work entitled "Credulity and Incredulity."

CASBIN, *Kashin*, *Kazbin*, or *Casveen*, a fortified city of Persia, in the province of Irak-Ajemi, 90 m. N. W. of Teheran, in lat. 36° 12' N., lon. 49° 53' E.; pop. in 1868 estimated at 25,000. It is surrounded by brick walls with towers, and is said to exceed Teheran in extent; but

whatever grandeur it may have once possessed has been destroyed by repeated earthquakes. Whole streets lie in ruins, and most of the ancient buildings have been overthrown. The palace, though much dilapidated, is still occupied by the governor. A mosque with a large dome, bazaars, schools, and baths are the other principal buildings. The chief manufactures are velvets, brocades, a coarse cotton cloth called *kerbas*, carpets, sword blades, and wine. Grapes and nuts are produced abundantly, and of good quality. It is also an entrepot for the silks of Ghilan and Shirvan destined for Bagdad and India, and for rice from the Caspian provinces. The surrounding plain was formerly one of the most productive districts of Persia, its natural fertility being greatly enhanced by a vast system of irrigating canals, most of which are now choked up, except in the immediate vicinity of the city. Casbin was founded about the middle of the 4th century, and under the Sasside dynasty became the capital of the kingdom. The removal of the government to Ispahan checked its prosperity.

CASCA, *Publius Servilius*, one of the conspirators against the life of Julius Cæsar. He had been attached to the Pompeian party, and, like many others of the dictator's slayers, submitted himself to Cæsar after the battle of Pharsalia, and received a free pardon. It is stated by Plutarch, in his life of Cæsar, that when Tullius Cimber, according to the preconcerted plan, gave the signal for the assassination by dropping the fold of his toga from his shoulder, Casca struck the dictator on the back of the neck with a short sword, or dagger, but failed to inflict either a deep or deadly wound, being under the influence of agitation, if not of fear, when delivering the blow. Cæsar on feeling the stroke turned round, it is said, abruptly, and caught the assassin by the arm, crying out, in Latin, "What dost thou, villain Casca?" when Casca calling to his brother in Greek, "Help, brother!" the others rallied to his assistance, and completed the bloody deed. Nothing is known of Casca's history after the death of Cæsar.

CASCADE RANGE, a chain of mountains in the W. part of Washington and Oregon, forming a continuation of the Sierra Nevada of California. It lies about 100 m. from the Pacific, and runs nearly N. and S. Its highest summits are Mt. Ranier, 14,444 ft., and Mt. Baker, 10,760 ft., in Washington. Mts. Pitt, Jefferson, and Hood are notable peaks of this range in Oregon. The name of the chain is derived from the cascades of the Columbia, which are formed where that river breaks through the Cascade range.

CASCARILLA (Span. *cascara*, bark), a medicinal bark, obtained from *croton Eleutheria*, a small tree or shrub which grows wild in the West Indies and Bahama islands, especially on the island of Eleuthera. It has a spicy, bitter taste, and is used as a tonic. When burnt, it emits an odor so agreeable that smokers have



Cascarilla (Croton Eleutheria).

sometimes mixed a small quantity of it with their tobacco, but this is very injurious.

CASCO BAY, on the coast of Maine, lying between Cape Elizabeth and Cape Small Point, 20 m. apart. It contains several hundred small islands, some of which are favorite resorts during the summer season.

CASE, in law, a formal statement of facts agreed upon by the parties, or stated by a judge, with a view to obtaining the judgment of the court thereon. Formerly in England cases were sometimes directed by the court of chancery, in suits pending therein, for the judgment of the common law courts, but this practice is now abolished.—Action on the case, or trespass on the case, is a form of personal action, first used in the reign of Edward III., as a remedy for injuries to which the forms then in vogue were not adapted, and receiving its name from the fact that the case of the plaintiff was set forth in the original writ. It is so comprehensive in its scope as to lie wherever a party has sustained a legal injury to person or property, for which no other form of action affords a remedy. This, which may be called a natural species of action, in contradistinction from those which are of a more technical character, is retained in the codes which have recently been adopted in several of the American states, the purpose of which has been to simplify pleadings and proceedings at law.

CASE, William, an American Methodist clergyman, born at Swansea, Mass., Aug. 27, 1780, died at Alnwick mission house, Canada, Oct. 19, 1855. He was received into the New York conference in 1805, and for 18 years was presiding elder in central and western New York and in Canada. In 1828 he was appointed superintendent of Indian schools and missions in Canada, which post he filled till his death, and became known as "the apostle to the Canadian Indians." He was the director of the Methodist ministry in Canada, and thus became powerful in shaping the religious history of that region.

CASEINE. See CHEESE.

CASERTA. I. Or *Terra di Lavoro*, a province of Italy, formerly a part of the kingdom of Naples, bounded by the provinces of Rome, Aquila, Campobasso, Benevento, Avellino, and Naples, and the Mediterranean; area, 2,307 sq. m.; pop. in 1872 695,754. It comprises the districts of Caserta, Nola, Sora, Gaeta, and Piedimonte d'Alife. The most important mountains are Mt. Matese in the southeast, the Tifati mountains in the south, and the Masicco in the northwest. The chief rivers are the Garigliano, with its tributary the Liri, and the Volturno. Agriculture is flourishing, and cattle raising is conducted on a large scale. The province has large woods and silk, linen, and tapestry factories. The marshes N. of the Volturno have by drainage been converted into arable land. II. The capital of the province, situated in a fertile plain on the railway line from Naples to Capua, 17 m. N. E. of Naples; pop. in 1872, 29,142. It is the seat of a bishop, has a cathedral, a seminary, numerous churches, a convent, a military school, and excellent barracks, and is noted for its magnificent royal palace and aqueduct, both constructed by Vanvitelli for Charles III. The palace contains a chapel and a large theatre, adorned with columns from an ancient temple of Serapis. The gardens are supplied with water from a distance of 27 m. by means of a fine aqueduct. The principal branch of industry is the manufacture of silks.—On the hills behind Caserta is *CASERTA VECCHIA*, surrounded by a wall and towers probably of the 8th century, and containing a splendid cathedral and other churches. It was once a place of great importance, but has been eclipsed since the foundation of Caserta. Both towns were founded by the Lombards.

CASE-HARDENING, a process of hardening the surface of iron by converting it into steel. For this purpose the articles are placed in an iron case, together with animal or vegetable charcoal, and subjected to the process of cementation. The carbon absorbed does not, in the short time allowed for the operation, penetrate beneath the surface. From two to eight hours is the usual time that the articles are exposed to a dull red heat. They are then taken out of the burnt bone dust or other carbonaceous substance, and further hardened by quenching them in oil or cold water. Sometimes they are left to cool in the case, and are afterward tempered. Prussiate of potash has in various ways been found a very useful material for affording its carbon to iron for producing steel. Being a combination of two atoms of carbon and one of nitrogen with one of potash, it offers no solid residue that interferes with the progress of the chemical change, or impairs the quality of the steel. In case-hardening, it is sprinkled or rubbed upon the iron heated to dull red, and this, after being put in the fire for a few minutes, is taken out and tempered in water. The process is a convenient one where small

articles are to be exposed to much wear, these being easily made of soft iron, and then externally hardened. It is also conveniently applied to give a good surface to small articles which are desired to receive the high polish of which steel is susceptible.

CASES, Count de Las. See LAS CASES.

CASE SHOT, or Canister Shot, a missile consisting of a number of wrought-iron balls, packed in a tin canister of a cylindrical shape. The balls for field service are regularly deposited in layers, but for most kinds of siege and naval ordnance they are merely thrown into the case until it is filled, when the lid is soldered on. Between the bottom of the canister and the charge a wooden bottom is inserted. The weights of the balls vary with the different kinds of ordnance, and the regulations of each service. For siege and garrison artillery, the balls are sometimes arranged round a spindle projecting from the wooden bottom, either

in a bag in the shape of a grape (whence the name grape shot), or in regular layers with round wooden or iron plates between each layer, the whole covered over with a canvas bag.—The Shrapnel shell, so called from its inventor, Gen. Shrapnel of the British army, is a thin cast-iron shell, from one third to three fourths of an inch thick, with a diaphragm or partition in the middle. The lower compartment is destined to receive a bursting charge; the upper one contains leaden musket balls. A fuse is inserted containing a carefully prepared composition, the accuracy of whose burning off can be depended upon. A composition is run between the balls, so as to prevent them from shaking. When used in the field, the fuse is cut off to the length required for the distance of the enemy, and inserted into the shell. At 50 to 70 yards from the enemy the fuse is burnt to the bottom, and explodes the shell, scattering the bullets toward the enemy precisely as if common case shot had been fired on the spot where the shell exploded. The precision of the fuses at present attained in several services is very great, and thus this projectile enables the gunner to obtain the exact effect of grape at ranges where formerly round shot only could be used.

CASEY, a central county of Kentucky, traversed by Green river and the Rolling fork of Salt river; area, 350 sq. m.; pop. in 1870, 8,884, of whom 544 were colored. The surface is hilly and broken. The Cincinnati, Lexington, and East Tennessee railroad is to pass through it. The chief productions in 1870

were 16,773 bushels of wheat, 356,850 of Indian corn, 42,747 of oats, 116,841 lbs. of butter, 22,469 of wool, and 145,982 of tobacco. There were 2,780 horses, 1,972 milch cows, 2,954 other cattle, 12,047 sheep, and 19,240 swine. Capital, Liberty.

CASHAN. See KASHAN.

CASHEL (anc. *Carsiol*, the "habitation in the rock"), a town of Ireland, in the county and 12 m. N. E. of Tipperary, and 90 m. S. W. of Dublin; pop. in 1871, 3,976. Part of it is well built, but it has a poverty-stricken appearance, is destitute of manufactures, and has been on the decline for many years. It contains an Anglican parish church, a nunnery, chapels, schools, barracks, a hospital, an infirmary, and court houses. Its most interesting object is the famous "rock of Cashel," which rises abruptly from the plain outside of the city, and is crowned with the finest collection of ruins in Ireland. These consist of a round tower, a



Cashel Cathedral.

splendid Gothic cathedral built about the 12th century, a monastery and a castle of about the same date, and a chapel of hewn stone, with a roof of the same material, built in the Saxon and Norman styles of architecture, and still showing marks of extraordinary beauty. These remains, which are visible at a great distance, are all within an enclosed area. At the foot of the rock are the ruins of Hore abbey and of a Dominican priory. Donald O'Brien, king of Limerick, and his nobles took the oath of allegiance to Henry II. here in 1172. Cashel was the ancient residence of the sovereigns of Munster, and is often dignified by the title of "the city of kings." In the civil wars following the rebellion of 1641, it was taken by Lord Inchiquin, and afterward by Cromwell. It is the seat of a Catholic archbishopric. The former Anglican archbishopric of Cashel has recently been united with the bishopric of Waterford.

CASHEW NUT, the fruit of the *anacardium occidentale*, cultivated in the West Indies and

other tropical countries. The tree, which resembles the walnut tree, is large, with oval, blunt, alternate leaves; the flower is rose-colored and fragrant; the stem furnishes a milky



Cashew Nut.

juice, which when dry becomes black and is used as a varnish. The tree also secretes a gum having the qualities of gum arabic, and known in commerce as codjii gum. In South America, from whence it is imported, book-binders use it as a varnish for their books to protect them from moths and ants. The fruit is a pear-shaped receptacle, having an agreeable acid flavor with some astringency, and at the end the kidney-shaped ash-colored nut. This has a shell of three layers, the outer and inner hard and dry, while the intermediate contains a quantity of black, acrid, caustic oil, strong enough to excoriate the lips of those who crack the nut with their teeth; and in India it is sometimes applied to the floors to drive away ants. To destroy this acrid matter, the nuts are roasted, which renders them when eaten wholesome and agreeable. The roasting is carefully conducted, as the acidity of the fumes is sufficient to produce severe inflammation in the face and hands of the roaster.

CASHMERE, or **Kashmir**, a kingdom in the N. W. part of India, almost enclosed by ranges of the Karakorum and Himalaya, which separate it from Chinese Tartary, Thibet, and the British districts of Lahoul and Spiti and the Punjab; area estimated at 75,000 sq. m.; pop. at 750,000. It extends from lat. 32° 17' to 36° N., and from lon. 73° 20' to 79° 40' E., and includes the famous vale of Cashmere, the provinces of Jammoo, Balti, Ladakh, Chamba, and some others.—The valley of Cashmere is of irregular oval form, shut in by lofty mountains, the summits of some of which are covered with perpetual snow. It is from 5,500 to 6,000 ft. above the sea, and the alluvial plain which forms its bottom is 70 m. long, 40 m. wide, and about 2,000 sq. m. in area, that of the whole valley being 4,500 sq. m. It is entered by many passes, 11 of which are practicable for horses. The highest, including that of the Pir Panjal, have

an elevation of about 12,000 ft. The principal river is the Jhylum, a tributary of the Indus, which receives numerous tributaries from the mountains, and flows through the Baramula pass into the Punjab. Several small lakes are scattered through the valley. Thus abundantly irrigated, and fertilized by rains which, unlike those of most parts of India, are light, the soil attains an extraordinary fertility, yielding returns of from 30 to 60 fold of the principal crops. Rice, the common food of the inhabitants, is the staple; wheat, barley, buckwheat, maize, and tobacco are cultivated to some extent; cotton is found to flourish; esculent vegetables, kitchen herbs, and saffron are abundant; and the lakes supply the poorer classes with a nutritious though insipid article of food in the *singhara* or water nut, the seed of the *trapa bispinosa*, which is ground into flour, roasted, boiled, or eaten raw. About 60,000 tons of this nut are annually taken from the Wullur lake. Among the fruits are the apple, pear, peach, plum, apricot, cherry, pomegranate, and grape. Flowers of rare beauty, particularly the rose, which is highly cultivated, abound in the valley. Many of the forest trees attain a vast size; among them are the Himalayan cedar, the chunar, the poplar, the lime, and the wild chestnut. The willow, maple, birch, alder, pine, and white thorn are common. Every village has its grove of chunars and poplars, planted centuries ago by order of the Mogul emperors, and now forming one of the richest ornaments of the valley. Bears, both brown and black, are very numerous. The other wild animals are leopards, jackals, foxes, stags, gazelles, and wild goats. Birds of prey are numerous, including a species of vulture of great size. Game birds are very plentiful. Venomous reptiles are rare. The native horses are small and hardy. Cattle, sheep, and goats are numerous.—The most valuable minerals are iron and limestone, both of which are abundant; copper, plumbago, and lead are also known to exist. The climate is salubrious, and milder than in many parts of India, but the stillness of the midsummer air gives the heat an oppressiveness scarcely to be expected from the range of the thermometer (80° to 85° at noon in the shade), and the winter is sometimes severely cold. Snow falls abundantly. The bulk of the inhabitants are Mohammedans, speaking a Sanskrit dialect, with a large admixture of Persian, in which latter tongue the records and correspondence of the government are written. They are divided in sect into Sunnis and Shiabs, the former being the more numerous and regarded as orthodox. The Cashmerians are preëminent among Indian nations by their physical perfections. The men are tall, robust, well formed, and industrious; the women famous for their beauty and fine complexions. They are a gay people, fond of pleasure, literature, and poetry, but are represented by many travellers as peerless in cun-

ning and avarice, and notoriously addicted to lying. They appear to be of Hindoo origin. At the beginning of the present century the population of the valley was 800,000, which



Cashmerian Boatmen.

has been reduced by pestilence, famine, and earthquakes to 200,000. In 1828 an earthquake destroyed 1,200 persons; two months later the cholera carried off 100,000 in 40 days; and in 1833 famine and pestilence committed still more frightful ravages. The chief towns are Serinagur or Cashmere, the capital (see SERINAGUR), Islamabad, Shupeyon, Pampur, and Sopur. The principal manufactures are the celebrated Cashmere shawls, gun and pistol barrels, paper, lacquered ware, and attar of roses.—The country was conquered by the Mogul emperor Akbar in 1587, by the Afghans in 1752, and by the Sikhs in 1819. It was included in the territory transferred by the latter to the British under the treaty of Lahore in 1846, and was immediately sold by its new owners to Gholab Sing for the sum of £750,000; but by the compact between the maharajah and the British government, the rajah is to be assisted in defending himself against his enemies, and British supremacy is acknowledged.—See Vigne's "Travels in Kashmir" (2 vols., London, 1842); "Travels in India and Kashmir," by E. Schönberg (2 vols., London, 1853); and "Diary of a Pedestrian in Cashmere and Thibet," by Captain Knight (London, 1863).

CASHMERE (Fr. *cachemire*), a textile fabric made of the fine wool of the Thibet goat. In Cashmere the wool is received from Thibet and Tartary, and, after being bleached, is spun and dyed of various colors. The weavers, employed by the merchants for a few cents a day, receive the yarns, and in their shops, or at looms in their own houses, proceed to weave them after the patterns ordered. Each loom

is estimated to produce five shawls a year; but a single one of the finest shawls sometimes occupies the work of a whole shop, keeping two to four persons constantly engaged upon it, for an entire year. The total number of looms in Cashmere, it is believed, is about 16,000. The process of weaving the shawls with variegated figures is conducted without a shuttle, each colored yarn of the woof being worked upon the warp with its separate wooden needle; and as the work goes on very slowly, it is customary to divide it among several looms, and then join the pieces together. This is so skilfully done that the seams are not detected. As the pattern is worked, the right side is the under one upon the frame, and is not seen by those who work it upon the upper or rough side. The shawls are made single and in pairs, either square or long; the former measures from 63 to 72 inches on a side, the latter 126 inches by 54. To work a single long shawl without a seam, and of the finest thread in the warp as well as the woof, in the most elaborate pattern and exquisite colors, would require the labor of about three years; and as in this time the colors are likely to change, and the fabric to receive injury from worms or otherwise, such shawls are rarely attempted. The fine shawls are more usually made upon 12 different looms for a pair.—The principal market is in the London semi-annual public sales, which of late years have materially decreased, chiefly owing to the direct importation into France by Paris houses having agents in Cashmere. In 1852 the London sales amounted to £100,000; in 1862, £270,000; in 1869, only £80,000. In 1871 the total import of India shawls into England was 1,557, against 3,343 in 1870. On account of the Franco-German war there was but one public sale in 1871, amounting to £27,000. In 1872 the June sale amounted to £36,245. These sales included long shawls, square with plain and filled centres, pieces, scarfs, cravats, capes, fringes, &c. The buyers are from France, Belgium, Germany, England, the United States, and sometimes from Russia and Turkey. The prices range from £2 to £70, and occasionally £100 for exceptional qualities and patterns. The finest and choicest shawls now go exclusively to Paris direct from India; Russians and Italians sometimes buy the best, but do not import them. Very few of the higher priced shawls are manufactured, though in some public sales in London shawls have been sold at from £160 to £220 each. The maharajah of Cashmere has control of the exports of shawls, and through his agents sends some to the London sales.—Various attempts have been made to naturalize the Thibet goat in Europe and the United States. In 1819 a cross between the Thibet and a Tartar variety was introduced into France, and subsequently some of the stock was sent to England. Some years ago Dr. J. B. Davis of Columbia, S. C., imported nine pure breed Thibet goats, the stock of

which was introduced into Tennessee and other states. But all attempts at naturalization have resulted in the production of an inferior quality of wool, owing, it is supposed, to the influences of climate. In California, however, the goat has been successfully introduced, and is now very numerous; and it is thought that the climate of that state will be favorable to the quality of the wool. The attempts to import and manufacture the wool in Europe have not been successful. The native weavers are brought up to the trade from their infancy, and are proficient in the highest degree; while to the water of India in which the wool and shawls are washed, and to the atmosphere, the brilliant colors of the cashmere shawls are supposed to be due. In Paris, Lyons, Nîmes, and Rheims there are extensive manufactories for the production of imitation cashmere shawls, the best of which are easily distinguished from the genuine ones by experts, but which are extensively exported. The value of India shawls imported into New York in 1872 was \$164,118.

CASIMIR (Pol. *Kazimierz*), the name of several monarchs of Poland. **I. The Peaceful**, son of Miecislav II. and of Rixa, a German princess, died in 1058. After the death of his father in 1034 his mother ruled the country as regent; but the favors she bestowed upon her own countrymen, and their ill conduct, caused an outbreak of national hatred, and Rixa fled to Germany. Casimir followed her. Poland, left without a ruler, became a scene of the wildest anarchy and lawlessness; the lately established Christian church also suffered greatly from pagan persecutions. Profiting by this state of affairs, the Bohemians made an incursion into Poland, and advanced as far as Gnesen. In 1040 Casimir was recalled by his countrymen from Germany, where he was living in quiet retirement occupied with exercises of religious piety, which gained him the surname of "the Monk." Slightly assisted by Henry III. of Germany, he regained his authority, and restored Christianity and a regular administration of justice, conquered Masovia, gained Breslau and other places from the Bohemians, and was honored with the title of restorer of Poland. His wife was Dobrogniewa, sister of Yaroslav, the grand duke of Kiev. His successor was Boleslas II. the Bold, his eldest son. **II. The Just**, born in 1138, died in 1194. He was the youngest of the four sons of Boleslas III., among whom that monarch divided Poland, and reigned over the reunited country after the expulsion of Miecislav III. in 1177. He is greatly renowned for his personal virtues, as well as for the introduction of laws defending the peasants against the nobles and officers of the court. Under him the Polish senate was first organized, consisting of bishops, palatines, and castellans. He made successful expeditions to Volhynia, Halicz, and Lithuania. **III. The Great**, born in 1309, died Nov. 5, 1370. He was the son and successor of Ladislas Lo-

kietek (the Short), who had restored the union and the power of the long distracted kingdom. While still a prince Casimir displayed his talents as governor of Great Poland, as well as his bravery in the wars of his father against the order of Teutonic knights, but also exhibited habits of great dissoluteness. In 1333 his father bequeathed him his throne, with the advice not to enter into any treaty with the Teutonic knights; but the inclinations of the young king were for peace, and he soon concluded a treaty, in which the knights ceded the districts of Kujaw and Dobrzyn, but gained Pomerania. To secure peace from the kings of Bohemia, he sacrificed to them the rich province of Silesia for the resignation of their claims on Poland. The Polish nation, dissatisfied with his acts, sought redress at the court of Rome. The pope gave a favorable decision, commanding the knights to restore all the Polish districts, and to rebuild the destroyed churches; but the knights scorned the bull, and maintained their conquest. In the mean while Casimir had strengthened his reign by salutary and peaceful reforms, as well as by the erection of numerous castles and fortifications. The adoption of his nephew, Louis, son of Charles Robert, king of Hungary, as successor to the throne of Poland, confirmed by the assembly of the nation at Cracow (1339), secured the alliance with Hungary. In 1340 the death of Boleslas of Masovia and Halicz, who died without progeny, offered a favorable opportunity for the annexation of Red Russia, which was easily executed in two successful campaigns. A consequence of these was an incursion of the Tartars (1341), at the summons of certain Russian princes, who pretended to have been wronged. Casimir fortified and defended the line of the Vistula, and by the speedy retreat of the invaders Poland escaped total destruction. In 1344 some difficulties, caused by the dukes of Silesia, brought about a short war with the king of Bohemia, which was begun by the conquest of Silesia, and ended with the acquisition only of Fraustadt. Subsequently parts of Lithuania, Masovia, and Volhynia were added to Poland. But the successes achieved by Casimir in time of peace were still more glorious. The diet of Wislica (1347) sanctioned a double code of laws for Great and Little Poland, digested by the ablest men of the country, based in part on the ancient statutes of the nation, and in part on the German or the so-called Magdeburgian institutions, according to which the commercial cities were governed. The rights of both nobles and peasants were determined and secured, and so great was the zeal of Casimir in defence of the latter against the former, that he was called the king of the peasants (*król kmiotków*). No less great was his ardor and activity in promoting industry, commerce, arts, and sciences (particularly proved by the foundation in 1364 of the university of Cracow), and in adorning and strengthening the country with buildings

for public use and defence; and thus he deserved the remark of an ancient historian, that he inherited Poland of wood and left it of stone. Agriculture, industry, and general wealth gradually increased under Casimir; and the riches and liberality of the state were displayed on the occasion of the marriage of his granddaughter with Charles IV., emperor of Germany, which was celebrated for 20 days at Cracow. But his reign had also its shades: unhappy marriages; love affairs condemned by the people and the church; an excommunication by the archbishop of Cracow; a deadly revenge taken on its innocent announcer; the subsequent humiliation of the king by the pope; and a great defeat by the Wallachians. A fall from a horse ended the life of the most popular monarch of Poland.—Among the objects of the love of Casimir was the Jewess Esther, the heroine of many romances, by whom he had several children, and who is supposed to have contributed greatly to the humane protection which he and his laws bestowed on her people in Poland, in the time of most barbarous persecutions in other parts of Europe. **IV.** Born in 1427, died at Grodno in 1492. He was the son of Ladislas Jagiello, and brother and successor of Ladislas III., at whose death in 1444 Casimir was grand duke of Lithuania. He accepted, but hesitatingly, the call to the throne of Poland. His long reign is remarkable for several diets held at Lublin, Piotrków, &c.; for a successful war of 14 years against the Teutonic knights, terminated in 1466 by the peace of Thorn, which gave to Poland the western part of Prussia and the suzerainty of the eastern; and for the subsequent long period of general prosperity, luxury, and relaxation of the national spirit. The introduction of the Latin language into the schools and public life of Poland dates particularly from this reign. Of the six sons of Casimir, one was elected king of Bohemia and Hungary, three, John Albert, Alexander, and Sigismund, succeeded each other on the throne of Poland, one became a cardinal, and one was canonized. **V.** See JOHN CASIMIR.

CASINO, or *Monte Casino*, a celebrated Benedictine monastery, established by St. Benedict in 529, upon the mountain of the same name, in the Italian province of Caserta, over the town of San Germano, the ancient Casinum, 48 m. N. N. W. of Naples, in former times the seat of a famous castle, and of a temple of Apollo. The beauty of the spot attracted many visitors to the abbey, and the medical skill of the friars many invalids, while pilgrims resorted there from all parts of the world, as the Benedictines were deemed to possess miraculous balms derived from Mount Zion. The monastery is a massive pile, more like a palace than a convent. The church, erected by St. Benedict, was destroyed in the 6th century by the Lombards, rebuilt in the 8th, destroyed by the Saracens in the 9th, restored at the beginning of the 10th, ravaged by the Normans

and rebuilt in the 11th; ruined by an earthquake in 1349, and restored in 1365; fell down in 1649, and was rebuilt as it now stands, and consecrated by Pope Benedict XIII. in 1727. Its interior surpasses in beauty and costliness of decoration every church in Italy except St. Peter's. In our times the abbey presents many intellectual attractions, as its inmates have established a press and published a variety of valuable works.

CASORIA, a town of Italy, 5 m. N. E. of Naples; pop. about 7,000. It is the birthplace of the painter Pietro Martino. It has four churches, and produces quantities of silk.

CASPARI, *Carl Paul*, a German theologian, born at Dessau, Feb. 8, 1814. He studied in Leipsic and Berlin, and in 1857 became professor of divinity at the university of Christiania in Norway. He has written a number of critical works on Biblical subjects, including treatises on Obadiah, Isaiah, Micah, Daniel, and the apostolic symbols, and has been active as joint editor of the Lutheran *Tidskrift* of Copenhagen. A third edition of his *Grammatica Arabica* appeared in 1866.

CASPE, a town of Spain, in the province and 50 m. S. E. of Saragossa, near the confluence of the Guadalupe with the Ebro; pop. in 1867, 9,402. It has a castle, several convents, and four hospitals. In the neighborhood are extensive plantations of olive and mulberry trees. In 1412 a congress was held here of the Aragonians, Catalonians, and Valencians, to settle the succession to the throne.

CASPIAN SEA (called by the Russians also the sea of Astrakhan; anc. *Mare Caspium* or *Hyr-canum*; Gr. *Καπρία θάλασσα*), an inland sea, lying between Europe and Asia, between lat. 36° 30' and 47° 30' N., and lon. 46° 48' and 54° 25' E.; greatest length from N. to S., 760 m.; greatest breadth, 300 m.; average breadth about 200 m.; area, according to Berghaus, 156,800 sq. m. It is bounded N. W., N., and N. E. by Russia, S. and S. W. by Persia, and E. by Turkistan. It has few bays, the most important being, on the Asiatic side, Emba bay, Mertvoi gulf, Karasu inlet, Manghishlak gulf, bay of Alexander, Kenderlinsk gulf, Kara-Bugaz bay, and Balkan bay; on the European side, Kizil Agatch and Kuma gulfs, and several smaller indentations. At the S. extremity of the sea is Astrabad bay. The Emba river, which enters the bay of its own name by several mouths, and the Atrek, are almost the only considerable rivers which it receives on the E. side, though the Oxus, or Amoo, which now enters the sea of Aral, is supposed to have once flowed into it. On the N. and W. its basin is far more extensive. The Ural, the Volga, the Kuma, the Terek, and the Kur here pour their waters into it, and most of them are constantly bringing accumulations of sand, which in some instances, as at the mouth of the Volga, form little islands, projecting several miles from the coast. All this part of the coast, as far S. as the Sulak, is of alluvial formation; thence S. to the penin-

sula of Apsheron it is of tertiary formation, broken by occasional carboniferous strata; and from Apsheron around the S. extremity of the sea, the shores are low and sandy, with lofty hills rising in the background. On the E. and S. E. is found a cretaceous subsoil, covered with moving sands; the surface, with the exception of Cape Karagan, being flat. In fact, the coast generally is so low that most parts are overflowed when the wind sets in strongly from the opposite quarter. Naphtha, or petroleum, is found in immense quantities, particularly in the vicinity of Baku on the peninsula of Apsheron and on the island of Naphthalia, in the bay of Balkan. There is a large export of petroleum to the Tartar and Persian ports on the S. and E. shores of the sea. In May, 1869, there was an extraordinary conflagration caused by the accidental ignition of large naphtha streams flowing on the surface of the sea. The waters are not so salt as those of the ocean, owing to the immense volume of fresh water constantly poured in by the Volga and other large rivers. It is very deep, particularly on the S. shore, where a line of 450 fathoms will not reach bottom; but in the north and off the mouths of the Volga it is quite shallow, with frequent shoals. There are no tides, and the sea has no outlet, the superfluous waters being carried off wholly by evaporation. Extraordinary changes in its level have been noticed, but never explained; according to native accounts, the surface rises and falls several feet in periods of about 30 years. It has long been known that the level of the Caspian is lower than that of the ocean, and in 1812 an attempt was made by Engelhardt and Parrot to ascertain the difference by a series of levellings and barometrical measurements across the Caucasian isthmus to the Black sea. Measurements were made in two places, one of which made the Caspian 348 ft. lower than the Black sea, and the other 301 ft. lower. A survey made by the Russian government in 1836-'7 proved the difference of level to be 84 ft. Sturgeon, sterlets, balugas, salmon, and seals are taken in great numbers.—We know little of the ancient commerce of the Caspian. About the middle of the 13th century much of the trade of W. Europe with India passed over it, Astrakhan being then, as now, its chief port. On the seizure of Constantinople by the Turks commerce was forced into other channels. In 1560 an English company made a fruitless attempt to render it a channel of commerce with Persia and Turkistan. Peter the Great had its coasts explored by Dutch navigators, partly with the view of founding stations for the Indian trade on the Persian seaboard, but his project was not carried out. No Russian conquest was made on the Caspian sea until the time of Catharine II., and it was not till still more recent periods that Russia succeeded in obtaining full control over its trade, which is small, though constantly increasing. The largest class of vessels navigating the Cas-

pian, carrying from 90 to 200 tons, are called *schuyts*, and are built of the timber of the boats that bring breadstuffs down the Volga to Astrakhan. Another class of vessels, of superior sailing qualities, carry from 70 to 140 tons, and are called *raschips*. Besides these, a great number of small craft are employed in coasting, fishing, and as lighters. The Caspian steamboat navigation company was chartered in 1858, and steamboats are now common on the Volga and at all the important ports in the Caspian. Canals uniting the head waters of the Volga with Lake Ilmen and the Duna establish connections between the Caspian and the Baltic. The Russian government has projected a canal to connect the Caspian with the sea of Azov, and then with the Black sea, for which surveys were made in 1855, 1860, 1864, and 1871. The principal ports are Astrakhan and Baku, from which trade is carried on with Astrabad, Balfrush, and other Persian ports on the south, and with Mangishlak, Balkan, &c., on the east. Russia maintains a fleet on the Caspian, and has three fortified settlements on the E. coast.—Dureau-Delamalle's *Géographie physique de la Mer Noire*, Eichwald's *Reise auf dem Kaspischen Meere und in den Kaukasus*, Hommaire de Hell's *Les steppes de la Mer Caspienne*, the *Beschreibung* published by Sawitsch and Sabler, giving their survey of the respective elevations of the Black and Caspian seas (St. Petersburg and Leipsic, 1849), and Petermann's *Mittheilungen*, iii., vii., 1869, contain valuable information on this sea.

CASS, the name of seven counties in the United States. **I.** A S. W. county of Michigan, bordering on Indiana; area, 528 sq. m.; pop. in 1870, 21,094. It has a level surface, diversified by a number of small lakes, and occupied by prairie, oak openings, and dense forests. Iron and limestone are the principal minerals. It is traversed by the Lake Shore and Michigan Southern, the Peninsula, and the Michigan Central railroads. The chief productions in 1870 were 630,271 bushels of wheat, 670,013 of Indian corn, 175,665 of oats, 302,058 of potatoes, 33,078 tons of hay, 443,182 lbs. of butter, 143,913 of wool, and 42,278 of maple sugar. There were 7,142 horses, 5,648 milch cows, 6,702 other cattle, 36,770 sheep, and 22,330 swine. There were 7 manufactories of agricultural implements, 11 of carriages and wagons, 7 of furniture, 5 of iron castings, 7 of saddlery and harness, 5 of tin, copper, and sheet-iron ware, 3 of woollen goods, 3 flour and 24 saw mills. Capital, Cassopolis. **II.** A N. W. county of Indiana, drained by Wabash and Eel rivers; area, 420 sq. m.; pop. in 1870, 24,193. In the vicinity of the rivers are high bluffs; the rest of the surface is generally flat, and divided between prairies in the N. and forests in the S. part. It is traversed by the Wabash and Erie canal, and by the Toledo, Wabash, and Western, and the Columbus, Chicago, and Indiana Central railroads. The chief productions in 1870 were

401,154 bushels of wheat, 312,434 of Indian corn, 90,835 of oats, 55,077 of potatoes, 11,934 of flax seed, 10,516 tons of hay, 310,588 lbs. of butter, and 56,444 of wool. There were 4,989 horses, 4,361 milch cows, 6,181 other cattle, 18,186 sheep, and 14,706 swine. There were 7 flour mills, 31 saw mills, 1 manufactory of cars, 4 of machinery, 9 of carriages and wagons, 5 of furniture, 2 of iron castings, 1 of linseed oil, and 5 of saddlery and harness. Capital, Logansport. **III.** A W. central county of Illinois, bounded N. W. by Illinois river, and N. by the Sangamon, both of which are here navigable by steamboats; area, 350 sq. m.; pop. in 1870, 11,580. The surface is level, and consists of prairies and woodlands; the soil is extremely fertile. It is traversed by the Peoria, Pekin, and Jacksonville, the Springfield and Illinois Southeastern, and the Rockford, Rock Island, and St. Louis railroads; the Jacksonville division of the Chicago and Alton railroad intersects the S. E. corner. The chief productions in 1870 were 139,219 bushels of wheat, 1,146,980 of Indian corn, 168,784 of oats, and 4,186 tons of hay. There were 3,513 horses, 2,281 milch cows, 6,198 other cattle, 4,235 sheep, and 12,685 swine. There were 3 flour and 2 saw mills, 1 paper mill, and 2 manufactories of carriages and wagons. Capital, Beardstown. **IV.** A N. central county of Minnesota, nearly encircled except on the west by the Mississippi, which rises in Itasca lake on its N. W. border; area, 4,750 sq. m.; pop. in 1870, 380. It is watered by numerous streams and lakes, the largest of which is Leech lake, in the N. part. Pine and other timber is abundant. The Northern Pacific railroad passes through the S. part. The estimated value of farm productions in 1870 was \$1,770; of live stock, \$1,360. **V.** A S. W. county of Iowa; area, 576 sq. m.; pop. in 1870, 5,464. It is traversed by the Nishnabotona river, an affluent of the Missouri, and watered by affluents of the Nodaway river. The Chicago, Rock Island, and Pacific railroad passes through it. The chief productions in 1870 were 54,529 bushels of wheat, 235,500 of Indian corn, 23,144 of oats, 13,857 of potatoes, 7,061 tons of hay, and 56,185 lbs. of butter. There were 954 horses, 868 milch cows, 2,398 other cattle, 1,886 sheep, and 1,820 swine. Capital, Lewis. **VI.** A W. county of Missouri, bordering on Kansas, intersected by a branch of the Osage river; area, about 1,000 sq. m.; pop. in 1870, 19,206, of whom 502 were colored. There are numerous springs of good water, and several quarries of limestone and sandstone. The surface is moderately uneven and occupied chiefly by fertile prairies. The Pacific railroad of Missouri crosses the S. E. corner. The chief productions in 1870 were 205,789 bushels of wheat, 1,711,952 of Indian corn, 262,472 of oats, 82,859 of potatoes, 12,100 tons of hay, 252,508 lbs. of butter, 22,680 of wool, and 19,281 of tobacco. There were 8,053 horses,

1,441 mules and asses, 5,366 milch cows, 13,514 other cattle, 9,187 sheep, and 33,140 swine. There were 6 flour and 7 saw mills, and 5 manufactories of saddlery and harness. Capital, Harrisonville. **VII.** A S. E. county of Nebraska, bounded N. by the Platte river, and separated from Iowa on the east by the Missouri; area, 570 sq. m.; pop. in 1870, 8,151. It is well watered and fertile, the surface being undulating prairie. The Burlington and Missouri River railroad traverses it. The chief productions in 1870 were 224,670 bushels of wheat, 674,558 of Indian corn, 137,986 of oats, 78,107 of potatoes, 11,971 tons of hay, and 171,262 lbs. of butter. There were 3,310 horses, 2,748 milch cows, 4,370 other cattle, 2,098 sheep, and 7,419 swine. There were 8 flour and 2 saw mills, and 3 manufactories of saddlery and harness. Capital, Plattsmouth.

CASS, Lewis, an American statesman, born at Exeter, N. H., Oct. 9, 1782, died in Detroit, Mich., June 17, 1866. He was the eldest son of Jonathan Cass, who served in the revolution and rose to the rank of major in the army. In 1799 he was stationed at Wilmington, Del., where his son found employment as a teacher. In the following year the family went to Marietta, Ohio, where Lewis studied law, and in 1802 he was admitted to the bar and began to practise in Zanesville. In 1806 he married Elizabeth Spencer, of Wood co., Va., and shortly afterward was elected a member of the legislature. In this capacity he drew up the address to Jefferson embodying the views of the legislature on Aaron Burr's expedition, and drafted the law under which Burr's boats and provisions, built and collected in Ohio, were seized. From 1807 to 1813 he was state marshal. In the war of 1812 he was colonel of the third Ohio volunteers under Gen. Hull, and after Hull's surrender was appointed colonel of the 27th infantry, and was shortly afterward promoted to the rank of brigadier general. At the close of the campaign he was in command of Michigan, and in October, 1813, was appointed governor of the territory. He acted as governor, and *ex officio* as superintendent of Indian affairs, for 18 years, during which time he negotiated 22 treaties, secured by cession of different tribes immense tracts of land in the northwest, instituted surveys, constructed roads, built forts, and organized counties and townships. In 1815 he purchased for \$12,000 a homestead tract of 500 acres in Detroit, which the subsequent growth of the city made immensely valuable. In 1820, in company with Schoolcraft and others, he explored the upper lakes and the head waters of the Mississippi, traversing 5,000 miles. The results of this and of subsequent expeditions were published in the "North American Review" in 1828-'9. In 1831 President Jackson nominated him secretary of war, and he was at the head of the war department during the first two years of the Florida war, 1835-'6. In

1836 he was sent as minister to France. In this capacity he settled the indemnity dispute by obtaining the interest withheld when the principal was paid. In 1837 he embarked at Marseilles in the frigate *Constitution* for Egypt via Constantinople, following the coast, stopping at the principal ports, and making excursions into the interior. He was on excellent terms with Louis Philippe, of whose character he gave a favorable account in his "King, Court, and Government of France," published in 1840. The most marked incident of his diplomatic career was his attack on the quintuple treaty for the suppression of the slave trade, which led to his resignation in 1842. In January, 1845, he was elected United States senator from Michigan, which place he resigned on his nomination, May 22, 1848, as democratic candidate for the presidency. A division in the democratic party in New York gave that state to Gen. Taylor, and secured his election by a majority of 36 electoral votes. In June, 1849, Cass was re-elected to the senate for the remainder of his original term. In the next session he vigorously opposed the Wilmot proviso, though he was instructed by the legislature of Michigan to vote for it. In 1850 he was a member of Clay's compromise committee, but did not vote for the fugitive slave bill. He was again elected a senator for six years from March 4, 1851. In the democratic convention at Baltimore, in May, 1852, he was a candidate for the presidential nomination, but was unsuccessful. In 1854 he voted for Douglas's Kansas-Nebraska bill proposing a repeal of the Missouri compromise, but including a provision embodying Cass's suggestion, in the famous Nicholson letter, to leave to the inhabitants of the territories the power to regulate their own institutions, subject only to the constitution of the United States. Subsequently he declined to obey the instructions of the Michigan legislature as to his votes on the Kansas question. In the democratic convention at Cincinnati, in May, 1856, he was not a candidate, and warmly concurred in the nomination of Mr. Buchanan, who on his accession to the presidency in 1857 nominated Cass as secretary of state. In December, 1860, when Buchanan refused to reinforce Major Anderson and re-provision Fort Sumter, he promptly resigned and closed a public career of 54 years. During the war he warmly sympathized with the national cause, and lived to see its complete success. He was a man of much ability and of the purest integrity, a fine scholar, and an effective public speaker. In private life he was distinguished for a generous hospitality, which his great wealth enabled him to dispense. Besides his published works above noticed, he was author of an "Inquiry respecting the History, Traditions, Languages, &c., of the Indians living within the United States" (Detroit, 1823), and of several historical and scientific sketches and addresses.—See "Life

and Times of Lewis Cass," by W. L. G. Smith (New York, 1856).

CASSAGNAC. See GRANIER DE CASSAGNAC.

CASSANDER, king of Macedon, son of Antipater, born about 354 B. C., died in 297. History gives no account of his life previous to 323, in which year he undertook a journey to Babylon, in order to defend his father Antipater from the accusations which had been made against him before Alexander. Cassander's pride, and his contempt for the servility he saw exhibited at the conqueror's court, are said to have offended that monarch and caused him to treat his visitor with indignity. Whatever may have been the cause, it seems certain that the interview between the two led Cassander to a violent hatred of the great ruler, so undisguised that when Alexander died but a short time after, Cassander's name was everywhere connected with a story which attributed his death to poison. When Antigonus was sent by Antipater against Eumenes in 321, Cassander was appointed chiliarch, or second in command of the expedition; and on the death of his father in 319, he was confirmed in this office by Polysperchon, whom his father, ignoring the claims of his son, had left regent of Macedonia. Indignant at being kept in a secondary position, he declared war against Polysperchon, having first formed an alliance with Ptolemy Lagi and Antigonus. Polysperchon had apparently won the favor of the Greek cities by declaring them independent of Macedonia, and Athens was especially well disposed toward him. He had also the influence of Olympias on his side; and Antigonus, whom he considered the most formidable of his opponents, was at war with Eumenes in Asia. But Cassander's general Nicenor held Munychia and the Piræus, the port fortresses of Athens. Polysperchon, accompanied by the royal family (Alexander's), began a march into Attica to attack these; but while he delayed in Phocis, where by a treacherous action (see PHOCION) he endeavored to render more secure the allegiance of the Athenians, Cassander suddenly appeared near Athens and occupied the Piræus with a large force. Polysperchon laid siege to it, but meeting with little success, he left his son Alexander to conduct the attack and went on into the Peloponnesus. Here he met with little resistance until he attacked Megalopolis, whose citizens repulsed his army at the same time that his fleet was destroyed by that of Cassander in the Hellespont. These defeats caused the Greek states to go over at once to the side of the victor, who treated Athens with clemency, and won friends throughout Greece by his justice and tact. In the mean time he had formed an alliance with the wife of King Arrhideus, Eurydice, an energetic and intriguing queen, who had determined to free herself from Polysperchon's oppression, and had herself raised an army with which she did Cassander good service in holding Macedonia. While he was pursuing his conquest in Greece, and just as he

had laid siege to Tegea, he received news that Eurydice and her husband, with Cassander's brother Nicanor and 100 of his friends, had been murdered by the orders of Olympias. He at once hastened homeward, cut off Olympias from her allies, besieged her in Pydna during the winter of 317, captured her in the spring, and at once had her put to death, in violation, it is said, of his special agreement. He now imprisoned Alexander's son, Alexander Ægus, and his mother Roxana, and further prepared his way to the royal power by marrying Thessalonica, Alexander's half sister. It was probably within a year of his marriage that he rebuilt the two cities of Therma and Potidæa, naming them Thessalonica and Cassandria. In 315 he returned to Greece, and began the rebuilding of Thebes, which Alexander had destroyed 20 years before. Polysperchon and his son had during his absence retaken some of the towns of the Peloponnese, but Cassander regained possession of them without difficulty; and within the next year he and Polysperchon ended their rivalry by forming an alliance with several other leaders against the now formidable power of Antigonus. War was begun in 313; but Antigonus by specious promises gained the allegiance of nearly all the Greek states, and two years' conflict which followed was unfavorable to Cassander and his friends. In 311 peace was declared; and during that year Cassander made further way for his ambition by ordering the murder of his two prisoners, Roxana and Alexander Ægus. In 310 war again broke out, and now Polysperchon once more opposed his old enemy, putting forward Hercules, another son of Alexander, as the proper heir to the throne; but Cassander won him over by bribes, and induced him in 309 to put to death his protégé and his mother. The ambitious ruler nevertheless lost ground rapidly; Corinth, Sicyon, and Athens, the only towns now subject to him in Greece, fell into the hands of the enemy in 308 and 307; a long series of defeats and indecisive battles followed; the war was carried into Asia without much change in its aspects; and it was only through the mistaken action of Demetrius, the son of Antigonus, who by going to his father's aid in Asia left Greece exposed, that affairs suddenly changed, and Cassander acquired a lasting advantage. The battle of Ipsus, in 301, in which Antigonus was killed, gave the allies a final victory; and Cassander, Ptolemy, Seleucus, and Lysimachus divided the dominion of the dead king among them, Cassander receiving Macedonia and Greece. His remaining years were occupied with schemes for wider conquest. He invaded the island of Coreyra about 299, but was almost immediately driven from it by Agathocles of Syracuse. In 298 he began the carrying out of plans for gaining complete possession of those cities of southern Greece which still held out against him; but his death occurred before he had gained any considerable success.

CASSANDER, George, a Flemish theologian, born in the island of Cadsand, Zealand, in 1515, died Feb. 3, 1566. He officiated for some time as professor of divinity at Bruges and Ghent, and gained a high reputation by his various attainments. In 1561 he published a treatise designed to reconcile the Catholic and Protestant theologians, which was attacked by Calvin, but favorably received by the emperor Ferdinand and other German princes, the emperor encouraging him to persist in his conciliatory task. In 1565 he published a famous work entitled *Consultatio de Articulis Fidei inter Papistas et Protestantos Controversis*, in which he reviewed the controverted articles of the Augsburg confession. He was sincerely attached to the Roman Catholic faith; but he was accused of taking too favorable a view of the points brought forward by the Protestants, and several of his writings were condemned by the council of Trent. His collected works were published in Paris in 1616.

CASSANDRA (called also **ALEXANDRA**), a Trojan princess, daughter of Priam and Hecuba. Apollo, enamored of her, permitted her to ask of him whatever she desired as a reward for her complaisance. She begged for the gift of prophecy; but when the god had bestowed it upon her, she refused to keep her promise to him. Thereupon Apollo, unable to withdraw from her the prophetic art, ordained that her predictions should never be believed. In vain she foretold that the abduction of Helen would cause the ruin of Troy, counselled the making of peace with the Atridæ, announced to Priam, Paris, and the Trojan people the fate which awaited them, and opposed the reception of the wooden horse. On the night of the capture of Troy she took refuge in the temple of Pallas, but was torn away from the statue of the goddess by Ajax, son of Oileus. She fell by lot as a slave to Agamemnon, who carried her to Greece; and, after fruitlessly advising that prince of the fate reserved for him, she perished with him in the massacre plotted by Clytemnestra. She is an important personage in Greek poetry, and is the heroine of a poem by Lycophron, celebrated for its obscurity.

CASSANO. I. A town of S. Italy, in the province of Cosenza, 10 m. W. of the gulf of Tarento, on the railroad which skirts the E. shore of Calabria; pop. about 8,000. It is built in the concave recess of a steep mountain, round an isolated rock, on which are the ruins of an ancient castle. It is the see of a bishop, and contains a cathedral, four convents, and an episcopal seminary; hot sulphurous springs and plaster and stone quarries are in the vicinity. The inhabitants are principally employed in the manufacture of macaroni, leather, table linens, and fabrics of cotton and silk. It is supposed to stand on the site of the ancient Cosa; according to some authorities, however, the neighboring village of Civit  occupies the real site of the ancient town. **II.** A town of N. Italy, on the Adda, 16 m. N. E. of Milan; pop. about

3,500. A battle was fought here, Sept. 16, 1259, which resulted in the defeat and capture of the tyrant Ezzelino. On Aug. 16, 1705, a victory was gained here by the French under Vendôme, over the imperial troops under Prince Eugene; and on April 27, 1799, the French, under Moreau, were defeated here by the Russians and Austrians, under Suvaroff.

CASSATION, Court of, the highest court of appeal in France. It was established by the constituent assembly toward the close of 1790, under the name of *tribunal de cassation*, with a view of putting an end to the confusion that had so largely prevailed in the judiciary system of the country, and of imparting to the whole jurisdiction a spirit of unity, without endangering the independence of the inferior courts. In 1804 the name of *cour de cassation* was given to the court, which it still retains. The functions of the court are not to go into the facts, but simply to revise the proceedings of the inferior courts, and any decision taken by the court of cassation is considered final and binding. It is composed of a president, 3 vice presidents (*présidents de chambre*), 45 counsellors, an attorney general (*procureur général*), 6 assistant attorneys general (*avocats généraux*), and a chief clerk (*greffier en chef*); and only 60 advocates are permitted to plead before the court. The president and counsellors are named by the government for life; the other officers are removable at pleasure. The court is divided into three chambers, one of appeals in civil and one in criminal cases, and the chamber of requests, a sort of preliminary tribunal, which decides on the *locus standi* and admissibility of the appeal.

CASSAVA, the meal, and bread made from it, obtained from the roots of several species of the genus *manihot* (from the Indian *manioe*),



Cassava (*Manihot utilissima*).

plants of the family of the *euphorbiaceæ*, which grow in the West Indies, South America, and Africa. Three species are described, but under different names by different botanists. The

genus, formerly included in the *jatropha* of Linnæus, was separated by Kunth, and called *janipha*; and the common species was designated as *J. manihot*, of which two varieties, the sweet and bitter, are distinguished. But later authorities designate the genus as *manihot*, and the common species as *M. utilissima*, another as *M. aipi*, and a third as *M. janipha*. The first is the bitter cassava, indigenous to Brazil, and cultivated in other parts of South America. It is a shrub 6 or 8 ft. high, with a large tuberous root, which sometimes weighs 30 lbs. This root contains a large proportion of starch, which is associated with a poisonous milky juice, containing hydrocyanic acid and a bitter acrid principle. The other two species do not possess this poisonous juice. All are used alike for the preparation of the meal. The root is well washed, then scraped or grated to a pulp, and this, when of the poisonous kind, is thoroughly pressed in order to remove the juice; but even if some of this is left in the meal, it escapes by its volatility in the process of baking or drying the cakes upon a hot iron plate. Afterward dried in the sun, the cassava is kept as food, to be mixed with water and baked like flour in large thin cakes. These are a coarse, cheap kind of bread, much used by the negroes and poorer whites, in which the ligneous fibre is plainly visible. Its nourishing qualities consist in the starch of which it is principally composed. The expressed juice also furnishes by deposition a very delicate and nearly pure starch, when left to stand for some time. Well washed with cold water, and afterward dried, this is the tapioca of commerce, sometimes called Brazilian arrowroot.

CASSEL, a town of France, department of Le Nord, on the railway from Lille to Dunkirk, 28 m. N. W. of Lille; pop. in 1866, 4,242. It is situated on an isolated hill 600 ft. high, commanding an extensive view, and has manufactures of lace, linen thread, and hosiery, breweries, tanneries, dye houses, and a considerable trade in cattle. It was the ancient capital of the Morini, and was known to the Romans as Castellum. It was strongly fortified during the middle ages. In 1071 Philip I. of France was defeated here by Robert the Frisian, count of Flanders; in 1328 Philip VI. won a complete victory over the Flemish troops; and in 1677 Philip, duke of Orleans, brother of Louis XIV., defeated here the prince of Orange.

CASSEL, or **Kassel**, a city of Germany, capital of the Prussian province of Hesse-Nassau, and of the district of Cassel, formerly the electorate of Hesse-Cassel, situated on the river Fulda, 90 m. N. N. E. of Frankfort-on-the-Main; pop. in 1871, 46,375, of whom about 5,000 were Roman Catholics, 1,500 Jews, and the remainder Protestants. It is connected by railway directly with Frankfort and Hanover, and thence with the rest of Germany. It is divided into the old town, the lower new town, and the upper new town, and has 10 Protestant churches, a Catholic church, and a synagogue. In St.

Martin's church are the tombs of many of the electors. The city contains the government buildings, the former electoral palace, a theatre, an observatory, and other fine edifices. The



Wilhelmshöhe.

museum, the finest building in Cassel, comprises collections of pictures and natural history, a cabinet of curiosities, containing a vast collection of watches and clocks from the earliest invented, and a library of about 90,000 volumes. The Friedrichsplatz, with a statue of the elector Frederick I., who was the founder and patron of the principal art collections of Cassel, is one of the most admirable public squares in Europe; and there are 15 other public squares. The public gardens are charming, especially that of Wilhelmshöhe, 3 m. distant, in which the summer palace is situated. Here is the cascade of the Karlsburg, consisting of a flight of stone steps extending 900 ft. up a hill on which is a colossal statue of Hercules. After the battle of Sedan, Napoleon III. was a prisoner at Wilhelmshöhe until March 19, 1871. There are manufactures of cotton, silk, and woollen fabrics, leather, hats, carpets, kid gloves, and porcelain; and the place is the main emporium of the trade of Hesse-Cassel. Two fairs and a wool market are held here annually.

CASSEL, **Paulus Stephanus Selig**, a German clergyman and author, born of Jewish parentage in Glogau, Silesia, Feb. 27, 1827. He was educated in both the Roman Catholic and Protestant gymnasia of Schweidnitz, completed his studies of history in Berlin under Ranke, became a journalist, and in 1855 a Protestant. Subsequently he was director of the royal library and secretary of the academy at Erfurt, the government giving him the title of professor. He removed to Berlin in 1859, and served in the Prussian chamber of deputies from 1866 to the end of 1867, when he declined a reelection to become minister of Christ church, which position he continues to hold (1873). His treatises on the history of Erfurt were followed in 1848 by his *Magyarische Alterthümer*, and in 1851 by an extensive historical article

on the Jews in Ersch and Gruber's cyclopædia, and a political disquisition, *Von Warschau bis Olmütz*, which attracted much attention. He has written also on various literary subjects; and his more important theological works are *Weihnachten* (1862), *Die Bücher der Richter und Ruth* (1865), *Sunam* (1869), and *Das Evangelium des Sohnes Zebedäi* (1870). His works for the young have passed through numerous editions, and he has also acquired eminence as a lecturer on the œcumenical council and papal history (1869-'70), and on the Franco-German war.

CASSIA, the bark of the *cinnamomum cassia*, an inferior quality of cinnamon which is often mixed with the genuine article. (See CINNAMON.)—Cassia is also a genus of plants of the family *leguminosæ*. Several species of this



Cinnamomum cassia.

genus furnish the officinal senna. One species native to this country is the source of the drug called American senna. The pod of *cassia fistula*, and perhaps an allied species, is employed to some extent as a laxative.

CASSIANUS, **Johannes**, a founder of monastic institutions, believed to have been born about 350, and to have died in Marseilles about 433. According to other accounts, he was a native of Greece, born about 360, and died about 448. He went when young to the Holy Land, remained some time in Bethlehem, spent many years among the ascetics of Egypt, was ordained about 403 as deacon by Chrysostom at Constantinople, and sent on a mission to Rome relative to the controversy with the Arians. Soon afterward he founded at Marseilles a nunnery and the abbey of Saint Victor, which is said to have contained during his time 5,000 inmates. His *De Institutis Cenobiorum* and *Collationes Patrum Sceticorum* constitute a code of monastical institutions, which, though strenuously opposed by St. Augustine, acquired great popularity, and was subsequently much admired by Thomas Aquinas, by the recluses of Port Royal, who adopted his regulations as the model of their monastic life, and by Arnaud d'Andilly, who embodied the ideas

of Cassianus in his *Vie des pères du désert*. He was eventually canonized, and his anniversary, July 23, was long celebrated at Marseilles. The best edition of his collected works is that reprinted at Leipsic in 1733.

CASSIN, John, an American ornithologist, born near Chester, Penn., Sept. 6, 1813, died Jan. 10, 1869. In 1834 he took up his residence in Philadelphia, and, excepting a few years partially given to mercantile pursuits, devoted himself to the study of ornithology. He contributed descriptions of new species and synoptical reviews of various families to the "Proceedings" and the "Journal" of the Philadelphia academy of natural science. His more elaborate publications are: "Birds of California, Texas," &c. (Philadelphia, 1855); "American Ornithology" (1856), containing descriptions and figures of all North American birds not given by former American authors, after the manner and designed as a continuation of the works of Audubon, with 50 colored plates; "Mammalogy and Ornithology of the United States Exploring Expedition;" "Ornithology of the Japan Expedition;" "Ornithology of Gilliss's Astronomical Expedition to Chili;" the chapters on rapacious and wading birds in the "Ornithology of the Pacific Railroad Explorations and Surveys;" and the ornithology of the "Iconographic Encyclopædia." His works are the result of careful research, and are especially valuable for their descriptions and classifications of many birds not given in the previous works of Wilson and Audubon.—He was of a Quaker family, several members of which have distinguished themselves in naval and military service. His great-uncle, JOHN CASSIN, a commodore in the American navy, conducted the defence of Philadelphia in the war of 1812. His uncle, STEPHEN CASSIN (1782-1857), also a commodore, served under Com. Preble in the war with Tripoli, and for his bravery in the action on Lake Champlain in 1814, under Com. McDonough, was rewarded by congress with a gold medal.

CASSINI, a family of Italian and French astronomers, four members of which were directors of the Paris observatory for the first 122 years of its existence. **I. Giovanni Domenico**, born at Perinaldo, near Nice, June 8, 1625, died in Paris, Sept. 14, 1712. While in college at Genoa he gained considerable reputation by his Latin verses; but his attention having been turned to mathematics, he abandoned poetry. He went to Paris as secretary in the suite of Lercaro, afterward doge of Genoa, who was then the head of an embassy to the court of Louis XIV. After the return of the embassy he accompanied Lercaro to his estates in Lombardy, and while there he devoted some time to the study of astrology, which led him to his lifelong pursuit of astronomy. In 1644, at the invitation of the marquis Malvasia, he went to Bologna, and in 1650 was appointed professor of astronomy in the university there. The marquis had built an observatory at the villa of

Pansano near Modena, and here Cassini made observations upon the comet of 1652 from which he published his first work. In the following year the church of St. Petronia in Bologna, where Ignazio Dante in 1575 had established a meridian line and gnomon, was undergoing repairs, and Cassini obtained the privilege of correcting and lengthening this line. He was very successful, and made observations in regard to the obliquity of the ecliptic, refraction, and parallax, which subsequent observations have shown to be very close approximations to exactness. In 1656 he published his tables of the sun founded upon these observations. In 1657 he was appointed superintendent of the Po for the city of Bologna, and he was afterward employed in many public duties by different cities and by the pope. He also found time to make a great number of observations upon insects, experiments upon the transfusion of blood, a subject which then attracted great attention, and to continue his astronomical observations. While at Ferrara he conceived the idea of a chart to represent the different appearances of an eclipse of the sun at various places on the surface of the earth; but the inquisitor of that city forbade its publication on account of its novelty. In 1665, at Città della Pieve in Tuscany, by means of a telescope furnished by Campani, he observed the shadows thrown upon the surface of Jupiter by his satellites when they pass between the planet and the sun, and distinguished them from the fixed spots. Having compared his own observations with those of Galileo, he constructed his first tables of the satellites. He very nearly approximated the truth in his calculations of the time of rotation of Jupiter, Venus, Mars, and the sun; and these discoveries exalted his reputation above that of any other astronomer then living. Though they really indicated nothing more than the use of good instruments by a careful and accurate observer, yet they were capable of being stated in definite terms which everybody could understand; and while the sublime discoveries of Copernicus and Newton were slowly struggling for recognition, all Europe was filled with the praises of the man who had laid open and stated in numbers the secrets of the heavens. In 1666 Colbert, chief minister of Louis XIV. of France, founded the royal academy of sciences and projected an observatory. He invited Cassini to take up his residence in Paris, offering him a pension equal to the emoluments of all the offices he held in Italy. Cassini arrived in Paris April 4, 1669, and on Sept. 14, 1671, commenced his observations. In this and the following year he discovered the third and fifth satellites of Saturn. In 1673 the Bolognese government requested him to return to that city, but Colbert persuaded him to remain in France. Cassini took out letters of naturalization as a French subject, and the same year married a French lady. Henceforth his time was mostly occupied in making observations and recording their re-

sults. His explanation of the lunar libration was more complete and accurate than any previously given, and is considered one of his finest achievements. He was the first who carefully observed the zodiacal light, although he did not, as is frequently asserted, discover it. In 1684 he discovered the first and second satellites of Saturn, and a medal was struck in commemoration of the event, with the legend *Saturni Satellites primum cogniti*. In 1693 he published new tables of the satellites of Jupiter, which were a considerable improvement upon those which he had previously published in 1668. He had long been in possession of all the data necessary to determine the velocity of the transmission of light; but when the announcement of the discovery was made by Olaus Römer, Cassini rejected it. He revisited Italy in 1695, accompanied by his son. The survey of an arc of the meridian of Paris, which had been commenced in 1669 by Picard, and continued to the north of Paris by La Hire in 1683, was completed by Cassini to the south as far as Roussillon in 1700. He continued his observations until a few years before his death, when he became totally blind. Cassini left a great number of writings, some of which have never been published; but very many appeared in the *Journal des Savants* and in the *Mémoires de l'Académie*. None of them are now consulted except in so far as they may contain records of facts and observations. He nowhere gives evidence of any acquaintance with the writings of Newton, and it has never been ascertained whether he rejected or adopted the Copernican theory of the solar system. He left an autobiography, which was published in 1810 by his great-grandson Cassini de Thury. **II. Jacques**, son of the preceding, born in Paris, Feb. 18, 1677, died on his estate of Thury, April 16, 1756. Some papers on optics by him and an elder brother, who was killed at the battle of La Hogue, were published in 1691. In 1694, when only 17 years of age, he was chosen a member of the academy of sciences, and the following year accompanied his father to Italy. He then travelled in Holland and England, where he made the acquaintance of Newton and many other distinguished men, and in 1696 he was made a member of the royal society. He participated with his father in the survey of the meridian, which he continued to Mt. Canigou in the extreme south of France, and afterward northward to Dunkirk. On the death of his father he succeeded him at the observatory, and was *maître des comptes*. In 1720 he published a work on the magnitude and form of the earth. He determined the times of revolution of the satellites of Saturn then known, first observed the inclination of the orbit of the fifth (now the seventh), and determined very nearly the variation of the obliquity of the ecliptic and the length of the year. In 1740 he published *Éléments d'astronomie*. Like his father, he was an excellent observer, but little of a philosopher. He seems to have been inclined toward

the Copernican system, to have had hardly any acquaintance with the theories of Newton, and to have been ignorant of the discovery of aberration by his contemporary Bradley. **III. César François** (CASSINI DE THURY), son of the preceding, born in Paris, Jan. 17, 1714, died Sept. 4, 1784. He became a member of the academy of sciences in his 22d year, assisted his father in the survey of the meridian, and succeeded him as director of the observatory and *maître des comptes*. His greatest work was the immense topographical map of France, upon which he labored for a large part of his life. It was finished by his son. Like his father and grandfather, he was an accurate and industrious observer, but contributed nothing to the advancement of astronomical science. **IV. Jacques Dominique**, count de Thury, son of the preceding, born in Paris, June 30, 1748, died there, Oct. 18, 1845. In 1770 he published an account of a voyage made by order of the king to test the chronometers of Le Roy, and the same year was admitted a member of the academy of sciences. He succeeded his father as director of the observatory. In 1787 he was associated with Méchain and Legendre in the operations to connect by a series of triangles the observatories of Greenwich and Paris. He completed the great map of France which his father had left unfinished, and on Oct. 13, 1789, he presented it to the national assembly as an aid in the new division of France into departments. In 1793 the national convention decreed that the observatory should no longer be under the control of one person, but of four, who should each serve in rotation for a year. Cassini and three of his pupils were appointed. He refused to submit to this, and on Sept. 6 of the same year he resigned. He was ordered to quit the observatory within 24 hours, and the next year he was imprisoned for seven months. On recovering his liberty he retired to his estate, abandoned astronomy entirely, and refused to take any part in the scientific operations undertaken by the government. **V. Alexandre Henri Gabriel**, a French botanist, son of the preceding, born in Paris, May 9, 1781, died of cholera, April 16, 1832. He commenced astronomical studies at an early age, but soon abandoned them and devoted himself in great measure to the study of botany, and published a large number of papers upon various parts of that science. He also held several judicial offices, being in the latter years of his life a member of the court of cassation. In 1827 he was made a member of the academy of sciences, and in 1830 a peer of France.

CASSINO, a game at cards in which four are dealt to each player, four being also placed on the board. There are generally four players. The greatest number of cards counts 3 points, and of spades 1; the 10 of diamonds, great cassino, 2; the 2 of spades, little cassino, 1; and each of the aces 1. The object is to take as many cards as possible. A player may take from the board any card corresponding to one

in his hand, or any cards whose combined spots equal the number of spots on any card in his hand. Thus, a 10 in the player's hand will take a 10 from the board, or any number of cards which can be made to combine into 10. The name of the play is derived from the societies' rooms in Italy, and continental Europe generally, under the name of casinos, where probably the name originated.

CASSINO, Monte. See CASINO.

CASSIODORUS, Magnus Aurelius, an Italian statesman, author, and ascetic, born at Scylacium about 468, died about 560. He was of an ancient and wealthy Roman family. In his youth he distinguished himself by his talents, and was appointed to high offices by Odoacer, king of the Heruli, the first barbarian king of Italy. After Theodoric, king of the Ostrogoths, had overcome and supplanted Odoacer, Cassiodorus for many years, and under various titles, was prime minister of the Gothic kingdom. When Theodoric in his old age began to persecute the leading Latins in his service, Cassiodorus resigned his situation and dignities, and retired to his estates. After the death of Theodoric he was recalled to power, and served with distinction and fidelity Amalasontha, Athalaric, Theodatus, and Vitiges. Upon the temporary triumph of the emperors of the East, being now 70 years of age, he retired again to the monastery of Viviers which he had founded in Calabria. In this retreat he passed the remainder of his days, which were prolonged until he was nearly a century old. His career as a historian and man of letters began when his career as a statesman ended. He taught his monks to labor in the fields as husbandmen, and to devote themselves to the copying of ancient manuscripts, then perishing rapidly under the effects of barbarian ascendancy and Roman neglect. This monastery was taken as a model for others founded in all parts of Christian Europe. His arrangement of the branches of a liberal education into grammar, rhetoric, and dialectics (the *trivium*), and arithmetic, geometry, astronomy, and music (the *quadrivium*), was accepted throughout the middle ages, and long after, as the only true programme of a liberal education. His writings on education form a considerable part of his literary remains. His history of the Goths in 12 books has not survived, but the epitome of the same by Jornandes is extant, and is an invaluable authority. Equally important in a critical point of view are his state papers in 12 books, which are the chief authority upon the internal condition and government of Italy during the period of Ostrogothic rule. The style is very florid and affected, the language very corrupt. He also wrote a universal history down to 519, and an ecclesiastical history from the era of Constantine down to the time of Theodosius the Younger. These works enjoyed great consideration during the middle ages, but since the revival of learning have fallen into oblivion. The first edition of his

works was published at Paris in 1584; the latest and best is that published by D. Garet at Rouen (2 vols. folio, 1679), and reprinted at Venice (1729). There are three biographies of Cassiodorus: one in Latin, prefixed to Garet's edition of his works; one in French by Saint-Marthe, Paris, 1695; and one in German by De Buat, in the first volume of the transactions of the royal academy of Munich.

CASSIOPEIA, a northern constellation, easily recognized by the form, a letter W, on the opposite side of the pole from the Great Bear; named from the wife of Cepheus, king of Ethiopia, and mother of Andromeda. The constellation was distinguished in 1572 by a brilliant temporary star which shone for 18 months and then disappeared.

CASSIQUIARE, or *Cassiquiari*, a remarkable river of Venezuela, deep and extremely rapid, which serves as the connecting link between the Orinoco and the Rio Negro. It furnishes the only example in the world of a bifurcation forming in the very heart of a continent a natural water communication between two great river valleys. It leaves the Orinoco about 20 m. W. of Esmeralda, and is at first scarcely 250 ft. broad; and after a S.W. course of nearly 130 m. it joins the Negro near the little town of San Carlos, its breadth having there reached over 1,500 ft. By means of the Cassiquiare canoes can penetrate with facility from the south of Brazil, from Peru and Bolivia, and even from the Argentine Republic, to Carácas through the Amazon and Orinoco and their various affluents.

CASSIS, in conchology, the name of a genus of univalve shells, including the species known as helmets. (See *HELMET SHELL*.)

CASSITERIDES, or the *Tin Islands* of the Greek and Roman writers, are supposed with much probability to be the modern Scilly islands near the coast of Cornwall, England. The Phœnicians, who discovered these islands and who kept the knowledge of them for a long time from other nations, traded there for tin with the inhabitants of the neighboring peninsula of Cornwall, where the tin was produced from mines, and was brought to the islands and sold to the foreign merchants. The islands themselves produced no tin. By a natural confusion of ideas the term Cassiterides or tin islands came in time to be applied to Cornwall itself, at least before the Roman settlement in Britain, when the true situation of the tin mines became known. (See *SCILLY ISLANDS*.)

CASSIUS. I. Longinus Caius, the leader of the conspiracy against Cæsar, died in 42 B. C. In 53 he was quæstor in the campaign against the Parthians, and distinguished himself by military skill, particularly after the death of Crassus, in the defeat at Carrhæ. Having collected the remains of the army, he defended Syria, and won in the next two years two victories over the Parthians. After his return to Rome he was tribune of the people, embraced the party of the senate at the outbreak of the

civil war, and followed Pompey, whose fleet he then commanded, in his flight. After the defeat at Pharsalia (48), he led the fleet to the Hellespont, but having fallen in with Cæsar, he surrendered. Cæsar pardoned him, made him prætor, and promised him the province of Syria. At the same time Cassius was engaged with Brutus in forming a conspiracy against the dictatorial rule and the life of his benefactor. Cæsar fell on the ides of March, 44, and the senate rewarded his murderers with provinces. Cassius received Syria, where he defeated his opponent Dolabella, plundered its cities to provide means for the war against Antony and Octavius, and returned with Brutus to Macedonia. The two ensuing battles of Philippi (42) ended their lives, with the hopes of the Roman republicans. In the first, Antony defeated the wing of Cassius, who, mistaking the cavalry of the victorious Brutus hastening to his relief for that of Octavius, killed himself, as Plutarch says, with the dagger which wounded Cæsar. In the second, Brutus, who mourned him as the last of the Romans, followed his example. **II. Cassius Parmensis**, so called from his birthplace, the city of Parma, was also one of the conspirators against Cæsar, after whose death he adhered to the aristocratic republican party of Brutus and his namesake Cassius, and fought on their side until their defeat at Philippi. He subsequently joined Pompey, and afterward surrendered himself to Antony, whose fortunes he followed until after the battle of Actium; he then retired to Athens, where he was put to death by order of Augustus. He was a poet of some eminence, not to be confounded with Cassius of Etruria, who is ridiculed by Horace in his *Sermones* for his facility and poverty of composition, and is believed to be the person alluded to by Shakespeare as torn to pieces in the streets of Rome by the rabble immediately on the celebration of Cæsar's funeral rites, and the raising of the people by Antony.

CASSIUS, Dion. See **DION CASSIUS**.

CASSIUS, Purple of, a pigment used for coloring porcelain and glass by fusing it with these substances. It is a precipitate obtained by adding protochloride of tin to a solution of chloride of gold. The purple powder thrown down is an obscure compound of sesquioxide of tin and oxide of gold. It contains of metallic gold 39·82 per cent. Its production is a test of the presence of protoxide of tin.

CASSOCK, a close garment resembling a long frockcoat, made of cloth or silk with a single upright collar, worn under the surplice by clergymen of the Roman Catholic and Anglican churches. In the Roman church it varies in color, being black for priests, purple for bishops, scarlet for cardinals, and white for popes. In the Anglican church it is always black, and worn by all orders of the clergy.

CASSOWARY (*casuarius galeatus*, Vieill.), a bird of the ostrich family, the only species of the genus. The bill of the cassowary is long,

compressed, and curved to the tip, the upper mandible overlapping the under. The wings consist of five strong rounded shafts without webs; the tail is not apparent; the tarsi are long and robust, and covered with large scales; the toes are three in number, all directed forward; the inner toe is armed with a very long powerful claw. The head and base of the bill are surmounted by an elevated compressed casque, or bony helmet; the head and neck are denuded of feathers, the skin being of a blue and violet color, with two fleshy wattles in front. It is a heavy massive bird, about 5 ft. high; the plumage is of a blackish color, the feathers being loose, and resembling delicate hairs; the feathers which take the place of the tail are pendent. The cassowary is a stupid, gluttonous bird, living on fruits, herbs, and occasionally on small animals; it is incapable of flight from the imperfect development of the wings, but it runs with great rapidity, and de-



Cassowary (*Casuarius galeatus*).

fends itself by means of its powerful feet. It lives in pairs in the forests of the Moluccas, of New Guinea, and other islands in the Indian archipelago; in some places it is domesticated. The female lays three greenish spotted eggs, on the bare ground, on which she sits during the night for a month; the young are of a red color, mixed with grayish. The cassowary, though it approaches the structure of common birds in the shortness of the intestines, and in the want of the stomachal sac between the crop and the gizzard, belongs evidently to the ostrich type, characterized by massive size, absence of wings, strength of lower extremities, flattened breast bone, and hairy nature of the feathers.

CASTALIA, a fountain at the foot of Mount Parnassus, near the temple of Apollo, at Delphi, in Phocis. It was, like the mountain, sacred to Apollo and the muses, which were therefore called Castalides. The Pythia used to bathe in its waters before delivering the ora-

cles of the god; it was regarded as a source of inspiration for poets, and had its name, according to some authorities, from Castalia, the daughter of Achelous, who, being pursued by Apollo, threw herself into the fountain.

CASTALIO, or **Castalion**, Sébastien, a French theologian, born in Dauphiny in 1515, died in Basel, Dec. 20, 1563. His family name was Châteillon, which he latinized into Castalion. Through the influence of Calvin he was made professor of classical literature at Geneva. Having quarrelled with Calvin, who caused his banishment in 1544, he repaired to Basel, where he taught Greek; but as his stipend did not suffice to support his numerous family, he was compelled to employ part of his time in agricultural labors. Besides several theological works, he made a Latin translation of the Bible, the best edition of which is in folio (Basel, 1573). He defended the right of free discussion in a collection of maxims compiled from various sources.

CASTAÑOS, **Francisco Xavier de**, duke of Baylen, a Spanish general, born in Madrid about 1755, died there, Sept. 24, 1852. In early life he was sent with Gen. O'Reilly to the court of Frederick the Great to study the art of war, and on his return to Spain he entered the army. When Napoleon invaded Spain, Castaños was appointed captain general of the Spanish armies in Andalusia. At Baylen, July 19, 1808, he encountered a French force under Dupont, who were surrounded and after some fighting forced to capitulate on the 22d, surrendering 18,000 men. He was shortly after routed by Lannes at Tudela (Nov. 23, 1808), and resigning his command became a member of the regency. In 1811 he was appointed to the command in Estremadura and Galicia, in 1812 was placed by Wellington in charge of the fortress of Ciudad Rodrigo, and early in 1813 was given the command of one of the four armies into which the Spanish forces were then divided. He contributed to Wellington's victory at Victoria, but at the close of the year he was removed by the new regency, under the pretext that he was needed in the council of state. After the restoration he was made captain general of Catalonia, an appointment which he resigned in 1816, but again accepted in 1823. In 1815 he was placed at the head of a force of 80,000 men destined to invade France, in 1833 received the title of duke of Baylen, and after Espartero's fall in 1843 became for a time the guardian of Queen Isabella. He became a senator in 1845.

CASTE. See **INDIA**.

CASTELAR, **Emilio**, a Spanish statesman, born in Cadiz, Sept. 8, 1832. His father, an exchange broker at Alicante, and afterward at Cadiz, spent seven years in the English possessions, chiefly in Gibraltar, to escape from the sentence of death passed on him for his implication in liberal movements. He died in Madrid in 1889, leaving his family almost destitute. Emilio nevertheless received a supe-

rior education. He early published novels, and subsequently became known as a democratic journalist and orator. In December, 1856, he was the successful competitor for the chair of history and philosophy in the university of Madrid, delivering at the same time lectures on the history of civilization in the Athenæum. He was deprived of his position in 1864, after having founded with Carrascon the journal *La Democracia*. This was suppressed in 1866, owing to his participation in the disturbances of June 22, when he was sentenced to death, but escaped in disguise to Switzerland and thence to France. When the revolution of September, 1868, began, he returned to Spain and was restored to his professorship. He kindled the enthusiasm of the people by his eloquent appeals in favor of democracy, and was elected to the cortes for Saragossa and Lérida. In this body he opposed Prim and Serrano, and subsequently King Amadeus, and became the most popular leader of the republican party. In 1873 he actively promoted the declaration of the republic, and was chosen minister of foreign affairs Feb. 12, and president of Spain Sept. 7, with extraordinary powers. He has published *Discursos parlamentarios* (3 vols., Madrid, 1871), and *Recuerdos de Italia* (translated by Mrs. Arthur Arnold, "Old Rome and New Italy," London, 1873).

CASTEL BRANCO, or **Castello Branco**, a city of Portugal, in the province of Beira, situated on the Liria, 42 m. N. E. of Abrantes; pop. 6,700. It is the see of a bishop, and has a college, two collegiate churches, and a ruined castle on the summit of the hill on which the town stands.

CASTEL-FIDARDO, a town of Italy, in the province and 11 m. S. of Ancona, near Loreto, on a range of hills between the Musone and the Aspio; pop. about 6,500. Near it the Italians under Gen. Cialdini defeated the papal troops under Lamoricière, Sept. 18, 1860.

CASTEL-FRANCO, a town of Italy, in the province of Treviso, 23 m. N. W. of Venice; pop. about 5,000. Here the French, on Nov. 23, 1805, gained a victory over the Austrians.

CASTELLAMARE, or **Castel a Mare**. **I.** A seaport of S. Italy, in the province and 17 m. S. E. of Naples, with which it is connected by railway; pop. in 1872, 26,381. It is situated on the lower slopes of the Monte d'Auro, along a sheltered beach, and commands an extensive view of the bay of Naples from Vesuvius to Miseno. It is defended by two forts, and contains a royal palace, a cathedral, five churches, several convents, manufactories of linen, silk, and cotton cloth, 12 thermal and mineral springs, and a national dockyard. It has acquired celebrity also as a summer resort, in consequence of the salubrity of its air and the beauty of its environs. It is built near the site of the ancient Stabiae, which, having been destroyed by Sulla during the civil wars, was afterward occupied principally by villas and pleasure grounds. It was here that the elder Pliny, wishing to approach as near as possible

to Vesuvius during the eruption which overwhelmed Herculaneum and Pompeii, met his death, A. D. 79. **II.** A seaport of Sicily, in the province of Trapani, 4 m. N. W. of Alcamo;



Castellamare di Stabia.

pop. about 9,000. The bay is spacious, but not safe during northerly winds. It exports wine, fruit, grain, manna, and opium.

CASTELLANETA, a town of S. Italy, in the province of Lecce, 18 m. N. W. of Taranto; pop. about 6,500. It is the seat of a bishop.

CASTELLI, Ignaz Friedrich, a German dramatist, born in Vienna, May 6, 1781, died near Lilienfeld, Feb. 5, 1862. He was educated for the law, but devoted himself to composing patriotic songs for the Austrian army, and preparing pieces for the stage. His songs having given umbrage to Napoleon, he fled to Hungary. In 1814 he accompanied Count Cavour as secretary to Paris, and afterward he served in the same capacity in Italy. In 1840 he retired with a pension and the office of state librarian. He was the author of many poems, popular songs, and miscellaneous writings, and was at various times connected with the press of Vienna, but is best known by his productions for the stage. More than 100 plays, partly adapted from the French, partly original, are attributed to him. In 1848, 100,000 copies of his political pamphlets in favor of the revolution were sold. His autobiography was published in 1861-'2, in 3 vols.

CASTELLÓN DE LA PLANA. **I.** An E. province of Spain, bordering on the Mediterranean, forming part of the ancient kingdom of Valencia; area, 2,446 sq. m.; pop. in 1867 (estimated), 288,921. It is very mountainous, and is watered by several small rivers, the most important of which are the Mijares and Palencia. It is well cultivated, produces grain, and has many mines and mineral springs. The chief towns, besides the capital, are Benicarlo, Villareal, and Burriana. **II.** A city, capital of the province, situated in a fertile region, 4 m. from the sea, and 38 m. N. by E. of Va-

lencia; pop. about 20,000. It has linen and sail-cloth factories, and carries on considerable trade in hemp. The former diocese of Castellón de la Plana is now united with Segorbe. An aqueduct, cut in great part through the limestone rock, brings the water from the Mijares, which is about 5 m. distant, into the plain in which the town is situated.

CASTELNAU, Michel de, sieur de la Mauvissière, a French soldier and diplomatist, born at Mauvissière about 1520, died at Joinville in 1592. He entered the army in 1547, and won the favor of Francis of Lorraine, grand prior of France, under whom he afterward served in the navy, and who on becoming lieutenant general of the kingdom (1557) employed him in diplomatic missions to Scotland, England, Germany, the Netherlands, Savoy, and Rome. He negotiated a treaty with Queen Elizabeth, and dissuaded her from insisting on the restoration of Calais. In 1560, after the death of Francis II., he accompanied Queen Mary to Scotland, and for a year rendered her efficient service in the field and in council. He distinguished himself in the civil war, negotiated a favorable treaty of peace with England, and was made governor of St. Dizier. He was again employed in various missions, was ambassador to England from 1574 to 1584, and on his return declared against the league. Henry IV. upon his accession treated him with great favor. His memoirs, written in England, extend over the period from 1559 to 1570, and are a valuable record of the events of the time. They were published in 1621, and are to be found in Petitot's *Mémoires relatifs à l'histoire de France*. He translated the Latin work of Ramus on the ancient Gauls. His life, by Le Laboureur, was published in Paris in 1659.

CASTELNAUDARY, a town of France, in the department of Aude, on the canal of Languedoc, 30 m. S. E. of Toulouse; pop. in 1866, 9,075. The reservoir of St. Ferriol forms a harbor, and an active trade is carried on in cereals, wine, fruit, cloth, linen, silk, cotton yarn, leather, and other articles. According to some authorities, the ancient Sostomagus was situated near Castelnaudary, the modern name being a corruption of *Castrum Novum Ariannorum*, as the new town was called after the old one had been destroyed in the 5th century. It became the fortified capital of the county of Lauragais, ruled by the counts of Toulouse. It suffered severely during the crusade against the Albigenses, and in 1211 was the scene of a battle between Raymond of Toulouse and Simon de Montfort, the former of whom destroyed the fortifications in 1229. In 1237 an *auto da fê* was enacted here, in which many persons accused of heresy were put to death. It was burned in 1355 by Edward the Black Prince, but was rebuilt in 1366. In September, 1632, the duke of Montmorency, commanding the forces of Gaston of Orleans, was defeated here by the royal force under Marshal Schomberg, wounded, taken prisoner, and executed.

CASTELSARRASIN, a town of France, in the department of Tarn-et-Garonne, 35 m. N. W. of Toulouse; pop. in 1866, 6,838. It has factories of hats, woollen goods, linen, and hosiery, and a large oil and saffron trade.

CASTEL-VETRANO, a town of Sicily, in the province of Trapani, situated on a hill 6. m. from the sea, 45 m. S. W. of Palermo; pop. in 1872, 20,420. The town is well built, and has a considerable trade in wine and olives.

CASTI, Giovanni Battista, an Italian poet, born at Prato, Tuscany, in 1721, died in Paris, Feb. 6, 1803. He was for some time professor in the seminary of Montefiascone, and afterward obtained a canonry in the cathedral there. Having gained the favor of Joseph II. of Austria, he spent several years as unpaid attaché to foreign embassies, and at the death of Metastasio in 1782 he received the appointment of poet laureate at the court of Vienna; but he relinquished this office after the death of the emperor Joseph, and spent the last years of his life in Paris. In early life he had written 18 poetical tales, and afterward added 30 more, making altogether 48, published in Paris in 1804, under the title of *Novelle galanti*, all loose. His fame depends on a political satirical poem, *Gli animali parlanti* (Paris, 1802). It has been translated into French and Spanish, and there is an abridged English version. He also produced several burlesque operas.

CASTIGLIONE. I. A village of Italy, near the lake of Gabii, 10 m. E. of Rome. It occupies the site of the ancient city of Gabii, and is rich in remains of antiquity. Old walls, portions of a temple of Juno, a Grecian theatre, and an aqueduct are among its most interesting ruins. **II.** A village of Italy, on the Stiviere, near the Lago di Garda, 16 m. S. E. of Brescia. The vanguard of the Austrian army under Wurmser was defeated here, Aug. 3, 1796, by the French under Augereau, and the main body two days later by Gen. Bonaparte. The battle of Solferino, June 24, 1859, was fought almost on the same ground.

CASTIGLIONE, Baldassare, an Italian statesman and author, born at Casatico, near Mantua, Dec. 6, 1478, died at Toledo, Spain, Feb. 2, 1529. His career commenced in the military service of the duke of Milan, but he is better known as a diplomatist, in which capacity he was intrusted by the dukes of Urbino with important missions to Henry VII. of England, Louis XII. of France, and Pope Leo X. He became a favorite of this pontiff, and was regarded as one of the ornaments of his court. Clement VII. subsequently sent him as nuncio to Madrid, but shortly after his arrival Rome was sacked by the imperialists under the constable de Bourbon. It was not possible for Castiglione to have foreseen or prevented this catastrophe, but the reproaches of those who insinuated that he had been neglectful of the interests of his country preyed upon his mind and hastened his end. He was universally lamented, and the emperor Charles V., in an-

nouncing his death, exclaimed, "One of the truest gentlemen in Christendom is dead." Castiglione was not a voluminous writer, but his published works are models of composition. His work on court life, entitled *Il libro del cortegiano*, was first printed by Aldus in 1528, and a version was published in London in 1727. He also published Italian and Latin poems and two volumes of letters.

CASTIGLIONE, Carlo Ottavio, count, an Italian philologist and antiquary, born in Milan in 1784, died in Genoa, April 10, 1849. In 1819 he published a description of the Cufic coins in the cabinet of Brera at Milan. His principal work in oriental literature, *Mémoire géographique et numismatique sur la partie orientale de la Barbarie appelée Afrikia par les Arabes* (Milan, 1826), is an effort to ascertain the origin and history of the towns in Barbary whose names appear on Arabic coins. In conjunction with Angelo Mai, he published an edition of Ulphilas's Gothic translation of St. Paul's Epistles, which Mai had discovered among the palimpsests of the Ambrosian library. Most of the dissertations which enrich the work, the publication of which extended through 20 years, were written by Castiglione.

CASTIGLIONE, Giovanni Benedetto, called IL GRECHETTO, a Genoese painter and engraver, born in Genoa in 1616, died in Mantua in 1670. He was a pupil of Paggi and of Ferrari, and according to some of Vandyke, and gained a high reputation as a historical, landscape, and portrait painter, and also as an engraver. His specialty, however, was animal painting. Many of his pictures are in the museum at Florence, and in the Louvre at Paris; and some have found their way to Venice, Milan, Munich, and Dresden.

CASTIGLIONE, Giuseppe, an Italian artist and missionary, born in 1698, died in Peking in 1768. He was thoroughly instructed in the art of painting, but joining the order of the Jesuits, Peking was assigned as the field of his labors, and there he passed the greater part of his life, in favor with several successive emperors. He made his art an accessory to his religious labors, and the emperor Kien-Long erected several palaces from designs furnished by him. He is said to have frequently exerted his influence to protect Christians from persecution.

CASTILE (Span. *Castilla*, so called from the number of its castles). **I.** An ancient kingdom of Spain, situated in the centre of the peninsula, and the source and chief seat of the Spanish nation. It is divided into Old and New Castile. Old Castile was the northern part, which first shook off the yoke of the Moorish conquerors, while New Castile was so called because it was a later acquisition. The Castiles occupy a large portion of the great central plateau, and their area of 45,000 square miles is about one fourth of that of all Spain. The people, about 3,000,000 in number, are a fine race, the heart of the Spanish nation as they are proverbially called—proud, manly, brave, and

self-respecting. Castile was perhaps never entirely subjugated by the Moors, and became fully independent after the middle of the 8th century, being ruled by counts. It was erected into a kingdom in 1033, when Ferdinand, son of Sancho III., king of Navarre, was made king. Upon the death of Bermudo III., king of Leon, in 1037, that kingdom was united to Castile. The two crowns of Castile and Leon were afterward separated and again united several times, until in 1479, Ferdinand II. of Aragon having married Isabella, queen of Castile and Leon, the three kingdoms were united into one. (See SPAIN.) **II. Old**, the northern division of Castile, bounded N. by the bay of Biscay and the Basque provinces, E. by Navarre and Aragon, S. by New Castile, and W. by Leon and Asturias; area, 25,409 sq. m.; pop. in 1867, 1,716,193. It is of very irregular shape, stretching from S. W. to N. E. In the north the Cantabrian range of mountains runs across the province. On the south it is divided from New Castile by the Sierra de Guadarrama, the Somosierra, and a continuing chain, which under different names forms also the E. boundary. The rivers are the Duero (Douro) in its upper course, its affluent the Pisuerga in the centre, and the Ebro on the north. There are numerous minor streams: the Riaza, Cega, Piron, Eresma, and Adaja, tributaries of the Duero; the Oca, Tiron, and Oja, affluents of the Ebro. These are torrents after rains, but in summer many of them are insignificant. The climate is dry and hot in the summer, dry and cold in the winter. The plains are almost deserts, whose vegetation affords but a scanty pasturage, and disappears entirely under the summer sun. On the seacoast, and in the mountains, valleys, and hill slopes, nature is much less sterile. Old Castile includes the provinces of Ávila, Burgos, Logroño, Palencia, Santander, Segovia, Soria, and Valladolid. The general occupation of the people in the interior is agriculture and grazing. In the towns some inferior manufactures, chiefly of coarse woollens, cotton, linen, leather, and glass, are carried on. Sheep and cattle are reared in large numbers and exported. Wheat and corn are also exported, and wines and fruits are produced in abundance. **III. New**, the southern division, bounded N. W. and N. by Old Castile, E. by Aragon and Valencia, S. by La Mancha, and W. by Estremadura; area, 20,178 sq. m.; pop. in 1867, 1,289,415. It is divided into the provinces of Madrid, Toledo, Guadalajara, and Cuenca. The principal rivers are the Tagus and its tributaries, the Tajuña, Henares, Jarama, Guadarrama, and Guadiela, and the Júcar, which falls into the Mediterranean, and its tributaries, the Guadazaon and Cabriel. The climate is the same as that of Old Castile. Large crops of wheat are raised, and the mountain slopes afford abundant pasturage. The vine is cultivated, and olives and oil, saffron, honey, and hemp are produced in considerable quantities.

Woollens, paper, linen, cotton, and silk are manufactured.

CASTILLA, Don Ramon, a Peruvian general, born at Tarapacá, Aug. 30, 1797, died May 25, 1867. He entered the Spanish army in 1816, and was made lieutenant in 1820. Soon afterward he joined the army of independence, and was made lieutenant colonel. In 1830 he went to Lima, and was appointed by Gamarra chief of staff of the whole army. He was made brigadier general by Orbegoso, the provisional president, whom he supported until the treaty with Santa Cruz, the president of Bolivia. He then fled to Chili, and in 1837 joined the army of the Peruvian patriots who marched against Santa Cruz. Castilla was second leader of the vanguard at the attack upon Lima and defeat of Orbegoso, and made common cause with Gamarra, who was proclaimed president by the patriots, while Castilla was appointed minister of war. In 1841 he was second in command of the Peruvian army which invaded Bolivia. In 1844 he overthrew the dictator Vivanco, and in the following year he was elected president of Peru. At the expiration of his term of office in 1851 he was succeeded by Gen. Echenique. Soon after, the administration of the latter having become unpopular, Castilla began a revolution at Arequipa, overcame Echenique, and entered Lima in 1855 as supreme ruler of the country. In this capacity he made many reforms, the most important of which was the abolition of slavery. He was reelected president in 1858, and two years afterward proclaimed a new constitution, which established universal suffrage and prohibited the exercise of every form of religion except the Catholic. In 1861 he made an unsuccessful attempt to annex Bolivia to Peru. In 1862 he was succeeded as president by Gen. San Ramon, and he in 1863 by Pezet. Castilla, having assumed a hostile attitude toward the latter, was arrested in 1865, but soon gained his liberty, and joined the movement under Prado. In 1867 he headed an insurrection against Prado, and was on his way to Arica when he died.

CASTILLEJO, Cristóval de, a Spanish poet, born at Ciudad Rodrigo toward the close of the 15th century, died in Vienna probably in 1556. Attached from the age of 15 to Ferdinand, the younger brother of Charles V., and afterward emperor of Germany, he subsequently officiated as secretary to that prince. He was a zealous champion of the old Spanish poets, and a decided opponent of the new Italian school. One of his most fanciful and characteristic poems is entitled "Transformation of a Drunkard into a Mosquito." His poetry, though circulated in manuscript, was forbidden by the inquisition, but a selection was permitted to be printed in 1573. His works were published in Antwerp in 1598, in Madrid in 1600, and reprinted in Fernandez's "Collection of Spanish Poets," 1792.

CASTILLO, Diego Enriquez de, a Spanish chronicler of the 15th century, born at Segovia. His

annals of the reign of Henry IV. of Castile, from 1454 to 1474, were published by José Miguel de Flores (Madrid, 1787). He also composed a poem relating to the death of Alfonso V. of Aragon, published by Ochoa (Paris, 1844), in the same volume with the inedited poems of the marquis of Santillana. Castillo is said to have fallen into the hands of Henry's younger brother Alfonso, the pretender to the throne, after the battle of Olmedo; but little is known about his career, except that he was employed in important missions.

CASTINE, a town and port of entry of Hancock co., Maine, on the E. bank of the Penobscot, 34 m. below Bangor; pop. in 1870, 1,303. It derives its name from the baron de Castine, a French nobleman, by whom it was settled in 1667, in company with a French colony, who afterward abandoned it in consequence of border wars with the Indians and English colonists. In 1760 it was settled by the English. It is situated on a peninsula, enclosing a spacious harbor always accessible to vessels of the largest class. Its inhabitants are chiefly engaged in ship building and fishing. For the year ending June 30, 1871, there were belonging to the port 347 vessels, of 23,997 tons; employed in the cod and mackerel fishery 148, of 6,100 tons; built 15, of 1,561 tons. It has a state normal school and three churches.

CASTING, the forming of metals and other substances by pouring them in a melted or liquid state into moulds, and allowing them to solidify by setting or cooling. The term when applied to the casting of metals is used synonymously with founding, and the place where the work is done is called a foundry.—The origin of the casting of metals cannot be traced; it was performed in the earliest times, and from the vestiges discovered seems to have been at first confined to ornamental articles, such as statues, medals, and parts of household furniture. The metal chiefly used by the ancients was bronze, and it is an interesting fact that their alloy contained about the same proportions of tin and copper as that which is used at the present time. Most of the bronze castings which have been discovered in excavations at Nineveh have been found, when analyzed, to contain about 10 per cent. of tin, the proportion now in use for the best quality of statuary bronze. Bronze castings have been found in Egypt which are thought to be 4,000 years old. A cylinder with the name of Pepi, of the sixth dynasty, and other bronze implements of the same age, all of which date more than 2,000 years before the Christian era, bear evidence of having been cast in moulds. It is related in the book of Deuteronomy that Og, king of Bashan, had a bedstead of iron, but whether wrought or cast is unknown. The earliest method of working iron was probably like that still in use in India and some other countries. The broken ore was mixed with charcoal and subjected by heat to deoxidation. The semi-plastic mass resulting from this treat-

ment was then hammered into a bloom, and this reheated and hammered until malleable iron was produced. It is probable that the metal was a long time used in this way before the melting and casting of it was practised. The account given of the molten calf which Aaron caused to be made of the ornaments brought to him, shows that the art of casting was brought by the Israelites from Egypt. From the description given of the articles made for Solomon's temple by the Tyrian master Hiram (1 Kings, vii.) there can be no doubt that many of them were cast: "For he cast (formed) two pillars of brass, of eighteen cubits high apiece." "And he made two chapters of molten brass, to set upon the tops of the pillars." "In the plain of Jordan did the king cast them, in the clay ground between Succoth and Zarthan." There is here not only evidence of the casting of bronze (for that is what is meant by "brass"), but also of the material used in making the moulds, which was the same as that used at the present day, namely, loam, and which composes the soil at the place where Hiram built his furnace. The bronze castings of the Assyrians were remarkably good, particularly those of animals, as is shown by the figure of a lion found by M.



FIG. 1.—Bronze Lion from Nineveh.

Botta in the excavations in the palace of Khor-sabad. This little statue is thought to have been cast in a single piece. That it is a work of Assyrian art is shown by the cuneiform characters that were found upon it. How long before the fall of Nineveh it was cast cannot be told, but it is probable that some of the bronzes found there are older than the temple of Solomon. In Babylon bronze statuettes have been found. We are told by Herodotus that both the town and palace gates were of this material; and it would seem from the accounts of Diodorus Siculus that they were so massive that they were not opened in the ordinary manner, but by a machine. Rawlinson assumes that they were cast. Fine works of Grecian art were made in embossed bronze as early as the 7th century B. C., but, according to historians, it was not till that or the following century that Rhæcus and Theodorus introduced bronze castings into Greece, and they

are sometimes spoken of as the inventors of this art. It is difficult to believe that it was not introduced there at an earlier period, when it is certain that it was practised at Tyre, distant but a few hundred miles by water, 400 years previously. However that may be, from the time of Theodorus it was carried to greater and greater perfection, until the time of Lysippus and Praxiteles, when bronze was moulded into forms of transcendent beauty. It is not unjust to assume that the world owes as much of its knowledge of casting metals to the old Greek sculptors as to any other source. The new art introduced by Rhæcus and Theodorus was transmitted to Crete, where two artists, Diponēs and Scyllis, were distinguished as sculptors in bronze as well as marble. They carried the art to Sparta, which afterward produced many artists of her own, among whom was Gitiadas, also celebrated as an architect, and who is said to have built the temple of Minerva Chalceicus at Sparta, and cast a bronze statue of the goddess. The colossal statue of Apollo at Rhodes, made by the sculptor Chares, a pupil of Lysippus, who flourished about 290 B. C., may be mentioned as an example of the magnitude to which the ancient Greeks were able to carry their works. This bronze statue was more than 105 ft. high, and, like modern statues, must have been cast in several pieces, which were afterward fastened together. The fragments into which it fell when destroyed by an earthquake 56 years after its erection lay on the ground 923 years, when they were sold by the Saracens to a Jew of Emesa, who loaded 900 camels with them. A fine example of bronze casting in the spirit of Lysippus is the beautiful statue of Mercury discovered at Herculaneum, and now in the



FIG. 2.—Bronze Statue of Mercury.

museum at Naples. Whether it was cast in Italy or brought from Greece is uncertain. Church bells are said to have been introduced by Paulinus, bishop of Nola in Campania,

about the year 400. They were probably introduced into England about the close of the 7th century. The great bell at Peking, cast in the reign of Yung-loh in the beginning of the 15th century, occupies a noteworthy place in the history of casting. It is 14½ ft. in height and 13 in diameter, and is estimated to weigh about 112,000 lbs. It is covered both within and without with perfectly formed Chinese characters, embracing 87 sections of the sacred books of one of the religious orders. The greatest feat, however, that was ever performed in bell founding was the casting of the great bell of Moscow, which occurred in 1733 in the reign of the empress Anna. It is 19 ft. 3 in. in height and 60 ft. 9 in. in circumference, and weighs 443,772 lbs. The appliances for melting this great mass of over 200 tons of bronze metal must have been stupendous, and have required technical knowledge of no mean order.

—The process of casting varies with the kind of article to be produced and the material of which it is made. In casting a statue or a bust of plaster of Paris, where perfection of exterior form is alone sought, it is only necessary to pour an indefinite quantity of the fluid mixture of plaster and water into a hollow mould and take an impression of its internal surface. In casting a medallion or cameo it suffices to pour the liquid material over a one-sided, open mould to such a depth as may be required. But in the casting of statues in bronze, or in the casting of bells, of stoves, of cylinders, and of pieces of machinery, and all other articles that are required to have a definite thickness and weight, it is necessary that the moulds shall have two or more walls. The casting of statuary in plaster of Paris and in bronze will be treated of at the end of this article.—Casting or founding may be divided into: 1, preparing a mould of the figure to be cast, which process usually includes the making of a pattern of such figure; 2, the melting and reducing to the proper degree of fluidity of the metal; and 3, the introduction of the molten metal into the cavity of the mould, and whatever manipulation may be necessary during the solidification and cooling. The mould may be made of metal, of stone, of plaster of Paris, of clay, of loam, or of sand. A metal mould may be formed either by excavating it with tools worked in a lathe or by the hand, or it may be cast in a similar manner to the article of which it is to form the mould. Small articles of the more fusible metals, and of simple form, are usually cast in metal moulds which are composed of two or more parts held together by hinges or pins. In using a metal mould, the molten metal, after being poured into it, may be allowed to solidify while cooling by the molecular attraction of its particles alone, or it may be so constructed that its contents are subjected to pressure during solidification. Bullets and small shot and printing types are examples of casting in metal moulds. Ingots of brass are examples of casting in stone

moulds, which are usually of granite. Easily fusible metals are sometimes cast in moulds of plaster of Paris, which possesses some advantages as a mould material in consequence of the ease with which it may be given various forms, and their great permanency under favorable circumstances. Those metals, however, which have high melting points cannot conveniently be cast in plaster moulds, because this substance readily crumbles when subjected to a heat above 400° F.—Before describing the casting of metals in sand and loam moulds, a brief description of the establishment where the work is performed is desirable. A well appointed foundry, in addition to the room required for the actual work of moulding and casting, should have rooms for storing and preparing

the materials of the moulds, such as grinding and sifting the sand, loam, sea coal, coke, plumbago, or charcoal. There should also be a workshop for making the patterns which are to be used in the formation of the moulds. The moulding room embraces an area of greater or less extent, but even in moderate establishments it is necessarily of considerable size. Where heavy articles are founded there are huge cranes for lifting and moving moulds and castings from one place to another. The floors of such foundries are also covered or rather filled with moulding sand to a considerable depth, varying from 5 to 10 ft. Fig. 3 represents the interior of a foundry for heavy castings. In one part of the room, usually at one side, and sometimes adjoining another room

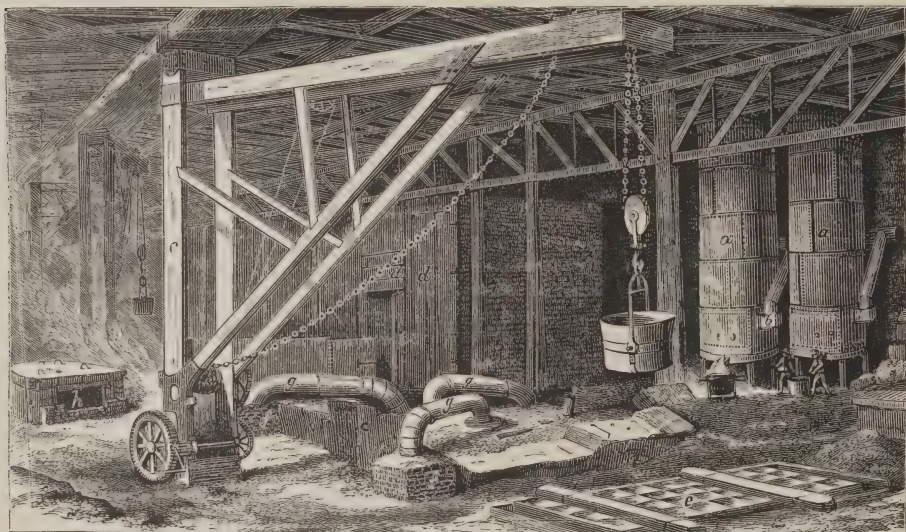


Fig. 3.—Interior of Iron Foundry. *a, a*. Cupola furnaces. *b, b*. Tuyeres. *c*. Crane. *d*. Ovens for baking moulds. *e*. Cope of a greensand mould, made in the floor bed. *f, f*. Temporary furnaces for forcing heat through the pipes *g, g* into a large mould. *h*. Mould of a steam cylinder, placed in a pit and in process of completion.

for making light castings, stands the furnace for melting the metal. This may be an air furnace, or that form of a blast furnace known as the cupola, which is most in use at the present time. Anthracite coal is used for fuel to a great extent in this country, but coke is better, and wood charcoal the best, on account of containing no sulphur. Unlike the air furnace, which depends upon the ascending column of air in the chimney for its draught, it is fed by a current of air forced in at the bottom through tubes called tuyeres by a blowing machine. The cupola is usually made of boiler iron in the form of a cylinder or cylindroid, lined with fire brick. It is from 10 to 16 ft. in height and from 3 to 6 ft. in diameter inside, and capable of melting from 5 to 15 tons of metal per hour. The chimney may be of brick, or of boiler iron lined with fire brick, which is more common. A cupola is often spoken of as holding a charge of so many tons of metal; but as only a limited

quantity of molten metal can be contained in it at one time, because it must be confined to the space below the tuyeres, its capacity is more correctly measured by the amount of metal it will melt in a given time. For a fuller description of its construction, see FURNACE. A sufficient explanation will be found in fig. 4 to enable the reader to understand the manipulations connected with the process of casting. The tuyeres, *a, a*, are seen to enter the cupola from 10 to 16 inches above its floor. The space just above the tuyeres has the shape of an inverted cone, which has the effect to hold the contents in such a relation to the blast as is best calculated to make it the most effectual. The floor of the cupola, *b*, when in use is composed of sand 6 or 8 inches in depth, lying upon the bottom plate *c*, which rests upon supports, and may be dumped by their removal. Some cupolas are chambered at the lower section, the blast entering through a row

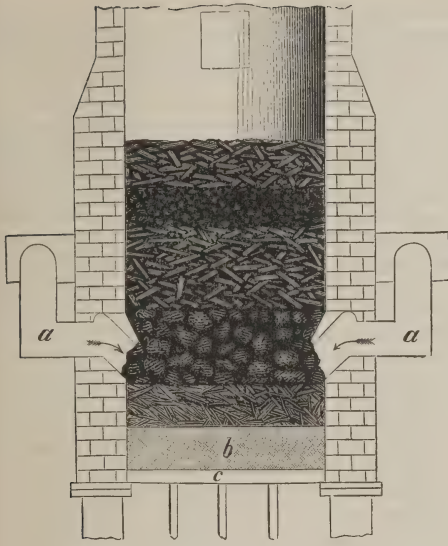


Fig. 4.—Perpendicular Section of Cupola.

of holes in the inner wall. In the upper part of the back of the cupola is the door for receiving the charges. Fig. 5 shows the exterior of the lower part of a cupola. A cupola is charged by placing a sufficient quantity of kindling wood upon the floor, and above this a layer of the best anthracite coal in large lumps, and in sufficient quantity to fill the cupola to the height of

tion would be checked, the metal become chilled, the process stopped, and the dumping of the charge necessitated. Upon the layer of coal thus carefully deposited, one of pig iron is placed, varying in quantity from 1,000 to 5,000 lbs., according to the size of the cupola and to the rapidity with which it is proposed to effect the melting; and upon this another layer of coal is deposited, and afterward succeeding layers of iron and coal. Fluxes are added where occasion requires, according to the judgment of the founder, pounded marble or limestone being most frequently employed. The wood is usually ignited when the first layer of coal is deposited, and in from an hour to an hour and a half the furnace may be tapped. It usually requires about 1 lb. of coal to melt 6 lbs. of iron. There is a wide difference in the processes of making heavy and light castings. A description of the latter, which is the simpler, will be given first. The first matter to receive attention is the selection and proper treatment of the sand, which is the material used for making the moulds of light castings; and it is one of the utmost importance, for it is only by the use of sand possessing certain properties that the formation and retention of a smooth and well defined cavity can be produced, having at the same time sufficient porosity to allow of the escape of air and gases which are generated during the pouring of the metal. If the sand is too dry, it will not admit of the formation of a defined cavity within it. It must possess in a certain degree the nature of a plastic or adhesive substance. Pure sand cannot therefore be used for a mould, and the best material with which it can be mixed is clay, but not to an extent to form what might be called a loam. Enough moisture must also be present to produce a proper degree of adhesion, but the quantity must be as small as possible, for too much would produce an amount of vapor when the molten metal is poured in that would injure or destroy the mould, or cause the surface of the sand to adhere to it on its removal. A fine sand which is slightly loamy is therefore selected, and this is not found in every locality where common sand exists, but has often to be transported considerable distances. The moulding sand which is used in New York city is principally obtained in New Jersey, in the vicinity of Troy and Albany, and from some parts of Long Island; but the cost of sand is not an item of much consequence after the first supply is obtained, as it is used over and over many times. That which is used in some parts of the mould is mixed with finely pulverized bituminous coal, coke, or plumbago, as the circumstances may demand; and these substances are frequently spread upon the surface of the mould, to effect various purposes, as will be explained further on. An apparatus called a flask contains the sand in which the mould is made. It is composed of three or more parts, a bottom board, a drag, a cope, and upon occasion one or more

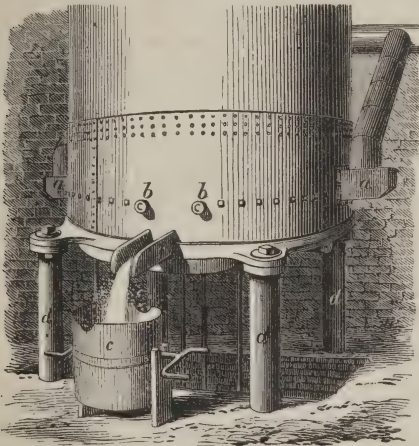


Fig. 5.—Lower Part of Cupola. *a, a.* Tuyeres. *b, b.* Small isinglass windows for showing the state of combustion and position of the layer of coal. *c.* Pot for receiving the melted metal. *d, d.* Columns of support. (The smaller upright rods support the movable floor, and stand in the pit below the cupola.)

several inches above the entrance of the tuyeres after it has well settled and the wood has burned away. This precaution must be carefully observed, because if the charge of iron above the coal should come down to a level with the entrance of the blast, combus-

cheeks. A wooden flask, containing one cheek and having the parts fastened together by clamps, is represented in fig. 6. The drag as well as the cheeks is a rectangular frame made of plank, similar to the four sides of a box without top or bottom. The cope is similarly constructed, but having in addition

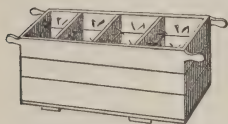


Fig. 6.—Moulding Flask.

one or more bars running across it, of variable depth, to suit the shape of the mould, and into which nails are driven to assist in holding the sand in place. Fig. 7 represents the construction of a wooden cope.

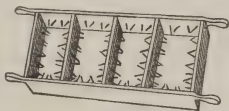


Fig. 7.—Cope.

Iron flasks have the same general construction, with the addition of strong ears by which they may be lifted with a crane. It is upon the proper construction and management of the flask, and the nice and exact mixing and tempering of the moulding sand, that much of the success in casting depends. Indeed, the founder regards his work as chiefly accomplished when the mould is fairly dressed and faced, and proper avenues have been provided for pouring and for the escape of air and gases, and the cope is readjusted to its place in such a manner that no part of the surface of the mould is disturbed. In making a flask mould, the moulder first lays upon the floor what is called a turn-over board, and upon this places the pattern. If this is of such a form that it will not lie firmly, or if it is liable to be bent or broken by packing of the sand upon it, it must be supported by a bed piece. Facing sand, which is prepared by mixing fine dry sand with the ground scrapings from the surface of previous castings, is then sifted over it, and the drag is laid upon the turn-over board. Sand is then thrown in, covering the pattern to a certain depth, and packed with the hand. More is then thrown in, perhaps enough to fill the drag, and then



Fig. 8.—
Rammer.

the moulder treads it down evenly with his feet, when, taking a rammer (see fig. 8), and using the end containing the pin, he proceeds to pack it firmly all round the sides of the drag. Then, using the butt end, he rams the sand firmly all over the mould. After the drag, and whatever cheeks may be used, are filled, the bottom board is placed over it and clamped or keyed to the turn-over board. The pattern is thus enclosed in a box, and lying upon its bottom, covered with sand. The drag is then turned over, bringing the bottom board to the bottom, and the pattern to the top. The clamps are then removed and the turn-over board is taken off, leaving one side of the pattern uncovered. With a parting trowel (a small thin-

bladed tool, similar in form to a bricklayer's trowel), a joint or parting is made by scraping away some of the sand from about the pattern, and especially to the furthest lateral lines, so that it may be drawn without injury to the mould. The surface of the sand is then smoothly dressed, and parting sand is sifted from a bag over its surface as well as that of the pattern, and the superfluous particles are blown away by a bellows. Pieces of wood, some cylindrical and some flat, are next placed upright on the surface, to form holes for pouring and for the escape of air, which is effected by their removal on the completion of the mould. The air holes are sometimes made with a pin, and are above the cavity; the pouring holes are usually at the sides, and connected by horizontal channels. Fine moulding sand is now sifted over to a sufficient depth to insure a smooth surface, and the cope is adjusted and clamped. (See fig. 9.)

More sand is then thrown in between the bars and tucked under them with the hands and well packed upon the pattern. Still more sand is again added and well packed with the rammer, and this process is repeated until the proper depth is attained. The pieces for forming the holes are now taken out, the clamps are removed, and the cope is lifted off to one side, or, if furnished with hinges, may be turned back upon them in the manner of a trunk cover (fig. 10). The pattern is then carefully lifted out of its bed, and if any corners or edges have been knocked off, or any other injury has been done, it is repaired with a trowel or some suitable tool. Pulverized



Fig. 9.

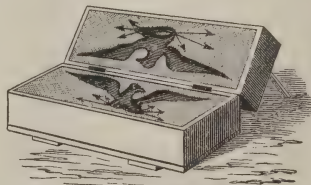


Fig. 10.—Drag and Cope, opened.

plumbago or charcoal is then dusted over the surface; and if fine work is required, the pattern is replaced and carefully pressed down to give as much perfection to the impression as possible. This operation is technically called printing. The pattern is then gently tapped with the handle of a tool, to loosen it, and gently raised with the fingers or some appropriate instrument, or by means of a screw inserted into a hole previously prepared. Channels are now cut in the surface leading from the points upon which the pieces for forming pouring holes stood to some part of the mould. The pieces still remaining in the cope are now removed and the holes are dressed. All particles of loose sand are then blown from the

surfaces of both parts of the mould, and the cope is gently replaced and secured with keys or clamps. The relation of the parts as they now exist is represented in section in fig. 11.



FIG. 11.—Section of Mould.

All that now remains to be done is to melt the metal and pour it into the mould; a critical operation, requiring much care, and not safely performed except by experienced moulders. The pouring is done from iron pots lined with clay, called ladles. They are of various forms and sizes, to suit the work to be done. Some have one handle, and are intended to be carried by one man. Others have the form represented in fig. 5, but with longer handles, capable of holding from 200 to 300 lbs., and are carried by two or more men. When the moulds are ready the furnace is charged in the manner already described, and one of the large carrying pots is placed under the spout. The melting point of cast iron varies somewhat, owing to its freedom from other metals and the quantity of carbon which it contains. Hard, gray cast iron melts at about 2,900° F. Scotch pig melts at a lower temperature than many other kinds, because of its large quantity of carbon. The best American iron is harder, contains less carbon, and requires more heat to melt it. It is a common practice among founders to melt different brands of iron together to give the mixture desired characteristics which they do not possess separately. The practice varies at different establishments, each founder having his own favorite formulas. When a sufficient quantity of metal in the cupola has attained the proper degree of fluidity, the clay stopper or plug is removed by the workman whose special duty it is to attend to the filling of the pots, and the molten iron is caught in the vessels which are held under the spout. Two or three men usually pour into one mould at the same time, through different gateways or holes, by which means the streams of metal, having a shorter distance to run than if poured through one gate, have less risk of losing the proper degree of fluidity by cooling. It is a common practice in foundries to pour the metal in the afternoon. The smaller articles are taken from the flasks the same evening, and the larger ones on the following morning. After the sand is rubbed from them they are carried to an adjoining apartment, where any roughnesses are chipped away by the chisel, and they are otherwise suitably finished. Hollow articles are often cast in moulds composed of parts, some of which are of greensand and some of dry sand or loam. The casting of a hollow column is an example. The outer part of the mould is made in a flask of two parts with greensand, from a solid pattern of the column. A core somewhat longer than the mould, made of a mixture of sand and paste, baked dry, is then placed in the axis of the

hollow mould, its extremities resting upon the sand beyond. The thickness of the walls of the column will of course be in inverse proportion to the size of the core. Small columns may be cast lying horizontally, but larger ones

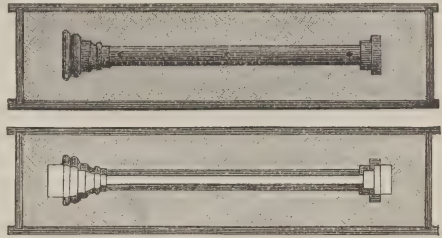


FIG. 12.—Mould for a Column.

should be cast vertically, and, if of much height, in sections. If cast lying down, they are liable to warp and to be of inferior strength in consequence of the opposite sides wanting uniformity of molecular structure and density. The casting of long, slender articles, such as ornamental railings, is simplified by a method patented by Mr. Jobson in England. He secures a finished brass or iron pattern to a plaster of Paris back or ramming block, upon which the mould is formed. When the model is removed the mould remains in the drag. A cope with a plane surface, or having a device corresponding to the other side of the pattern, and which has been formed from a reverse block, is then placed over the mould, and the necessary holes having been prepared, the metal is poured. Mr. James L. Jackson, of New York, has taken out a patent for making patterns entirely of plaster of Paris and other plastic materials, thereby greatly reducing their cost. They are swept with a templet which may be made to move in either straight or curved lines. The labor and time of making the large and accurate castings for the fronts of buildings are by this process very greatly reduced. A bed piece or rest, of plaster, is first swept with a templet, and after the surface of this is properly prepared, another layer of plaster mixture is spread on, and this swept with a templet of corresponding form but of larger size. In moulding, the pattern lies upon the rest when the first side is rammed in the drag. When the pattern is long it is sawed into transverse sections to facilitate the handling. These may be adjusted together and will serve the purpose of a whole piece. Greensand moulding is often practised with only part of a flask, the cope, the sand bed of the floor taking the place of the drag. A bed is carefully prepared and levelled, the pattern imbedded in its surface, and the sand well rammed about it. The pattern is then carefully cleaned and the surface of the bed levelled and dressed, leaving a certain portion of the pattern projecting above the surface. Parting sand is then sprinkled over both pattern and bed, and a cope is laid down and rammed, it being prop-

erly secured from rising by weights. The cope is then lifted off by a crane, and while suspended its surface is dressed and properly prepared. The pattern is lifted out, and the mould in the bed repaired and dressed, when the cope is replaced, the holes for pouring and for the escape of air and gases having been provided for. Being then securely weighted, to prevent rising from pressure of metal and gases, it is ready for the pouring of the metal. In fig. 3 a greensand floor mould is represented at *c*.—In the casting of metals, especially those having high melting points, there is always more or less production of gases, together with expansion of air; and if the operation were performed in a mould which was not porous, the bubbles would mar the surface of the casting as well as enter to a certain extent into its interior. It is therefore necessary that the mould should possess sufficient porosity to allow of the escape of æriform matter. Moisture in a mould is only admissible in small castings which cool quickly. Used for large masses of molten iron, the amount of steam formed, together with the expanding gas, would not only endanger the mould, but also the workmen. Dry moulds made of loam are consequently used in heavy castings, partly for the above reasons, and partly because sand could not be properly manipulated or retained in place in large and massive castings. The casting of large cylinders, bed plates, and condensers for steamships is a very intricate process, requiring good engineering abilities, skill in draughting, and experience in the designer as well as in those who execute the work. The moulds are usually worked from drawings instead of being formed upon patterns. A single piece of machinery is often complex in form, and as the art of the moulder consists in forming a hollow cavity where the carpenter or cabinetmaker would make a solid body, it must be seen that he has a much more difficult task before him; for he has not only to form an inside structure similar to the future cast, but an outside one of a reverse form as well; and these two forms must be perfectly related to each other. He has also to provide channels and gateways for the pouring of the metal, and they must be so arranged as to secure its perfect flowing to every part, and as nearly as possible its simultaneous cooling. Allowance must also be made for shrinkage, and an almost infinite number of precautions, suited to particular exigencies as they arise, must be observed. The draughting requires great forethought and calculation, and the execution not only involves a perfect comprehension of the plan, but a constant vigilance in avoiding errors and causes of miscarriage. A description of the moulding and casting of a complex piece of machinery would require a very great detail of explanation and numerous illustrations, and then could not be comprehended except by repeated visits to the foundry. The moulding and casting of a simple cylinder will therefore be taken. A

loam mould, secured in a pit, and ready for casting, is represented in fig. 13. It is constructed in the following manner. An iron foundation plate is laid upon the floor of the

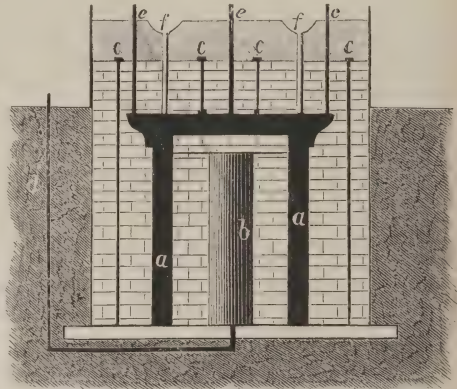


FIG. 13.—Loam Mould. *a*. Hollow mould, surrounding the core, and surrounded by the cope. *b*. Hollow inside of core. *c, c*. Bolts holding cope together. *d*. Air tube for discharging air from core. *e, e*. Air tubes. *f, f*. Pouring holes.

foundry, and levelled. An iron ring, flat and of a breadth equal to the thickness of the walls of the core which is to be built upon it, and of a diameter equal to that of the inside of the future cylinder, is laid down, and the core is built upon it to the height desired. An apparatus for describing and sweeping the surface of the core is now erected, which is called a sweep, and consists of a spindle and templet, represented in fig. 14. An arm, *a*, supported by some portion of the building, holds the upper end of the spindle *b*, while the lower end turns in a hole in the centre of the foundation plate. A collar, *c*, which may be adjusted at any required height, is provided with an arm, to which again the templet *d* is firmly held by means of a mortise, which slides over the arm, and may be set at any desired distance from the spindle. From the construction of the machine it will be perceived that it may be used to describe either the inner or outer surface of a cylinder; therefore it serves to give form both to the surface of the core and to the inner surface of the cope. After the sweep is placed in position the core is commenced by building up a cylinder of brickwork upon the circular plate, its dimensions being governed by the templet, which in sweeping about its axis should leave a small space between itself and the bricks to allow of finishing with loam. The bricks are laid up in loam, and the same

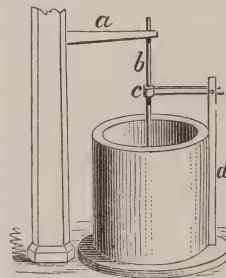


FIG. 14.—Sweeping the Core.

material is laid upon the surface until it has sufficient thickness to be scraped off by the templet, as shown in fig. 14. The top of the core may be swept and levelled by the arm, the templet being removed. If the cylinder is to be cast with a bottom, an iron plate is fitted to the upper end of the core, and a proper

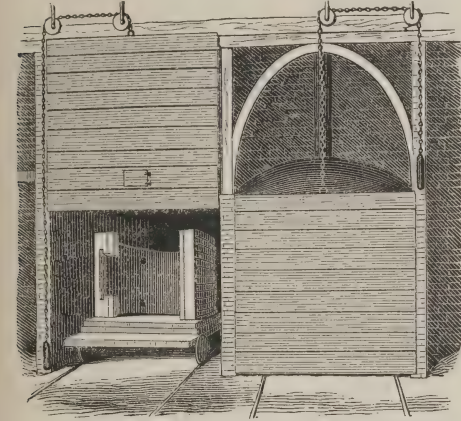


FIG. 15.—Drying Ovens.

thickness of loam laid upon it. This may be built upon the core, or it may be done separately, and the parts put together after they are dried. When the core is finished it is lifted, by a crane by means of chains or rods attached to the circular plate upon which it rests, upon a car which passes on a track to one of the drying ovens represented in fig. 15. The templet is then placed at that distance from the spindle by which it will describe the inner cylindrical surface of the cope, which is built up with brickwork and loam in a similar man-

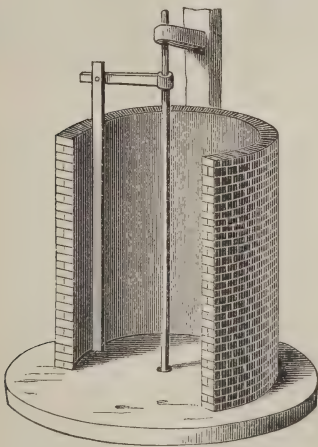


FIG. 16.—Sweeping the Cope.

ner with that used for the core, except that for convenience it is usually built in two sections (see fig. 16). Iron rods are laid in the brickwork, passing from top to bottom, and securely

fastened to the bottom plate. A cap is then made by fitting an iron plate to the top, adding brick and loam, and securing it by the rods which pass through the walls from the bottom plate. When finished, all these parts are washed with a mixture of charcoal or plumbago dust and water, the mixture being sometimes applied two or three times. A strong cross piece of iron is then fastened to the top of the cope, hoisted by means of a crane upon the carriage, and taken to the oven. After both core and cope have been thoroughly dried, they are lowered into a pit formed in the floor of the furnace. (See fig. 3, *h*.) Upon the bottom of this pit there is an iron foundation upon which the cope and the core both rest, and to which they are properly adjusted and secured. Care has been taken to provide the cope with the necessary holes for pouring and for the discharge of air. Sand is then thrown into the pit about the sides of the mould, and well tamped down to prevent any spreading during the casting. The relation of the parts is represented in fig. 13. A powerful expansive force is applied to the interior of the mould when the hot metal is poured in, and the greatest precautions must be taken to have all the iron fastenings as well as the sand tampings strong enough to withstand the pressure. Into the holes intended for the escape of air iron tubes are placed, of sufficient length to reach above a layer of loam which is now laid over the cope. Into the holes for pouring plugs are placed and the loam formed around them in cups, which are connected with channels through which the metal runs in pouring. In the figure a tube is seen leading a few inches downward from the lower part of the hollow of the core, then horizontally beyond the edge of the mould, and thence up to the surface of the foundry floor. This is for the purpose of carrying off gaseous products from the core. In casting a cylinder without a bottom, it will only be necessary to have a tube extend directly upward to the surface. It will be noticed that the holes for pouring are placed immediately over the hollow mould, and not, as in casting statuary, connected with channels in the cope entering at the bottom of the mould. The securing of the mould for the cylinder of a large steamer is a matter which requires the greatest vigilance. The pit into which it is lowered must be dry, and is generally built like a cistern and bricked and cemented on the sides and bottom; and care must be taken to keep the mould dry till the casting is done. The cope must be well bolted to the bars that come through the sides from the bottom. A rim of iron plating may be placed around the part that projects above the ground, reaching high enough above the top of the cope to hold a layer of sand. A heavy iron cross is then raised over the mould and fastened with bolts, by which and also by its weight it aids in sustaining the strain at the time of casting. This is called packing. Fig. 17 represents the packing of a mould for a large cylinder. To

furnish sufficient metal for the casting of a cylinder of 24 tons, two large cupola furnaces are required, capable of melting 10 or 12 tons of iron per hour. A reservoir which will con-

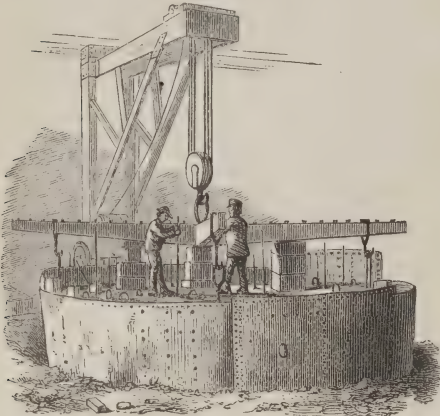


FIG. 17.—Packing the Mould of a Steam Cylinder.

tain 8 tons of the molten metal is erected at the side of the mould, at such an elevation that the metal will flow with a moderate current into the channels on the top; or two such reservoirs may be placed, one on either side, the rest of the metal being poured from kettles suspended by cranes. The reservoirs are tapped from a hole in the lower part, in the same manner as the cupola is tapped, but the kettles are turned by an apparatus of wheel work adjusted to the bail. Each kettle may contain from 4 to 6 tons of molten iron, and the apparatus for pouring them must be of the most substantial character; for if any part of it should break, severe accidents would be almost sure to follow. The melted metal in the reservoirs and kettles is kept covered with lumps of charcoal, which are raked off when the pouring is made. In the casting of cylinders, the shrinkage of the iron in cooling must always be particularly taken into consideration. This is quite uniform, and is one inch in 8 ft., or $\frac{1}{8}$ linear measure. The circumference of a cylinder, therefore, having a diameter of 8 ft., will shrink on cooling 3.14159 inches; and if it were cast over a perfectly incompressible core, it would necessarily be ruptured unless the core were removed before the shrinking began. Mr. Robert Cartwright has patented a process which has been used in casting the cylinders for the pneumatic piles for the great bridge over the Missouri river at Leavenworth, Kansas, with satisfactory results. It consists in making the core in sections and joining it together in such a way that it may be taken to pieces and removed immediately after the cast is made. It is designed especially for cylinders open at both ends, but may be varied so as to be used when they are cast with the bottom upward.—Brass and bronze founding is very similar in its details to that of iron.

The moulds for casting these alloys are made of the same material as for iron, although for the casting of fine articles of bronze a finer and more compact loam is used. The melting for large castings is usually done in a reverberatory furnace, charcoal being the best fuel. Cupolas are sometimes used, but at a great waste of the more oxidizable alloy. When the quantity is not large, black-lead crucibles are used, which are heated in a furnace placed beneath a platform raised one or two feet above the floor, for convenience of handling. The construction of a furnace for melting brass and bronze is shown in fig. 18, the first flue being represented in section. The melting point of brass containing 33 per cent. of zinc is between 1,800° and 1,900° F. That which contains more zinc melts at a lower, and that which contains less at a higher temperature. The copper is usually melted first and the zinc added. Bronze containing about 10 per cent. of tin requires heating some 200° higher; but bell metal, containing 22 per cent. of tin, melts at about the same temperature as ordinary brass. Anthracite coal is used for heating the crucibles, and

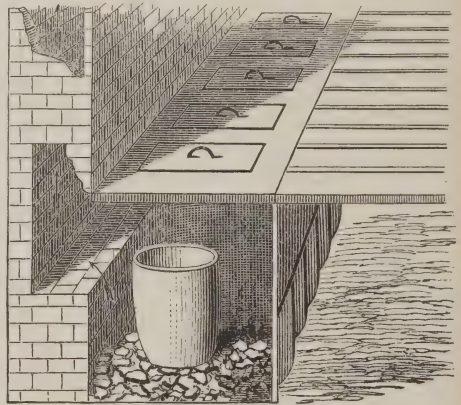


FIG. 18.—Furnace for Melting Brass.

the surface of the alloy is covered with charcoal, which of course is consumed and adds to the heat, at the same time that it prevents oxidation. The pouring is performed in the same manner as for iron. The screw propellers for first-class steamships are made of bronze to enable them to resist the action of salt water. The moulds are of loam, and for small wheels are made upon patterns, but for large ones are swept and modelled with tools. Sometimes the hub of the wheel is swept with a templet, while the wings are separately moulded on a pattern. This is the most convenient, and perhaps the most perfect method, as the precise curve can more readily be given to the surface of the wings. The alloy for propeller wheels contains 10 per cent. of tin.—The casting of bells is usually performed in the following manner: The mould of a small bell is made with a pattern, the process being very simple

when compared to that required for pieces of machinery. It may be made of moulding sand or of loam. If of the former, the pattern, which is of the exact size and form of the future bell, is laid, mouth downward, upon a turn-over board, and dusted with coke dust or charcoal. A drag of sufficient depth is then placed upon the board and rammed full of sand. The bottom board is then clamped on, and the flask is turned over and a cope adjusted and rammed full of sand, the necessary holes being provided for. The cope is then taken off, the pattern removed, the mould properly dusted with parting sand, and the parts replaced and clamped together, when the piece is ready for casting. For large bells the method pursued is similar to that for large cast-iron cylinders. A sweep is constructed having a templet which may be used to sweep the interior of the cope or the surface of the core. The core is built of brick and loam upon an iron plate, and swept in the same manner as the core of a cylinder, and the cope, made of brick and loam also, and bolted, which is to form the exterior of the bell, is swept like the cope of a cylinder. The surfaces are then washed with charcoal or plumbago mixture, and dried in the oven in the usual way. The parts are then sunk in a pit upon a bed plate, secured, and the pit well rammed with sand, pouring and vent holes having been provided. The top of the cope is covered with loam through which holes are made connecting with those in the cope, and channels are formed in it to receive the metal. The core must be so constructed that it will yield when the metal shrinks on cooling, which is the case with bronze as with cast iron. If rupture is not produced by rigidity of the core, the metal will have a strain of tension which will be likely to cause fracture when the bell is struck. It may be constructed with bands of straw wound around it, over which loam is spread before finishing with the templet. The Messrs. Meneely of West Troy, N. Y., use perforated cases (fig. 19), upon which the core as well as the cope is formed. The cone upon which the core is made before being spread with loam is wound with ropes of straw, which yield sufficiently for the contraction of the bell. The outer case is spread with loam on the interior, the holes with which it is pierced allowing of the expulsion of expanding air and gases. For casting of heavy guns, see CANNON.—*Casting in the Fine Arts.* Before treating of the casting of statuary and other



FIG. 19.—Meneely's Cases.

articles of sculpture in metals, it will be proper to describe the more simple methods of casting them in plaster of Paris. This substance possesses peculiar properties which give it a wide application in nearly all the arts. Gypsum, from which plaster of Paris is made by calcination, is a hydrated sulphate of lime containing about 20 per cent. of water by weight. Where a large, but not necessarily definite quantity of this water is driven off by a gentle heat, the gypsum, after being ground and sifted, becomes the beautiful white article known as plaster of Paris. This substance possesses the property of recombining with the same amount of water which the heat had driven off. When mixing it for use, however, a much larger quantity of water is used, sometimes twice or three times as much; but for making strong moulds, as little is used as will answer to render the mixture fluid. A definite quantity of water enters into chemical combination, and the rest is held in the pores of the plaster when it sets, most of it afterward passing away by evaporation. A proper mixture of plaster and water possesses the property of running into the minutest parts of a mould, so that the finest lines may be copied with considerable approach to perfection. For this reason it is often used in electrotyping, for taking casts, upon which the metal is subsequently deposited by galvanic action; and also for taking casts of leaves of plants, and other articles of a similar character. The mixture sets in 20 or 30 minutes after being stirred, depending upon the quality and quantity of the plaster used, and upon the presence of other substances, such as lime, alum, or cream of tartar, which may have been added to it. The casting of models in bass relief is quite a simple process, and is performed in the following manner. The mould is made by simply laying the model, which is usually made upon a plate of glass or a slate, upon a table and pouring over it the mixture of plaster and water. If the model is in clay, it should be wet with water, and the slate slightly greased with lard oil. It is not necessary to build a barrier about the edge of the slate, for the mixture poured on with a cup or a large spoon, first over the object, soon becomes thick enough to allow of its being spread over the slate without running off. The mould may be made from one half to one and a half inch in thickness. In from 50 to 70 minutes it will set firmly enough for removal, which may be done by carefully introducing the blade of a stout knife under its edge, and gently raising it with the assistance of the hand. If the model is not undercut, the mould may be used in one piece for casting several copies. If, however, projections are left, the mould must be broken away from the cast, or else it must be composed of more than one piece so that it may be drawn. When a mould is broken off it is called a waste mould, and when in parts it is called a piece mould. When a model is undercut it may be made flush by

adding clay. A whole mould may then be taken, and such portions as were added may be removed from the cast by appropriate tools, thus avoiding the use of a piece mould. When the mould is made in parts, it may be done by pouring the plaster over a portion, letting it set, removing it and paring the edge, which is slightly oiled or washed with a mixture of clay and water, replacing it, and adding one or more sections afterward. Another plan, which may be practised with great facility, is to make the mould in one piece and afterward saw it into sections with a very thin, fine saw. If a very fine impression is desired, the mould should be saturated with water, laid upon its back, and, if composed of more than one piece, held in place by supports. A mixture of plaster and water, carefully stirred together, is then turned into the mould and over the plane surface, to an extent sufficient to form a base to the cast, of any desired dimensions. If several copies are wanted, and there are no very fine lines to be preserved, the mould may be varnished with shellac and alcohol. Previous to applying the varnish it may be painted with linseed oil, in which case it should first be dried; but if oil is not used, the varnish may be applied to the green mould with more advantage than to allow it to dry. In removing the mould from the cast a good deal of care is required, and successful manipulation is not attained without considerable experience. In making a cast of a clay model of a bust, two methods may be pursued. The entire model may be covered over with the plaster mixture, by throwing it on in a creamy state with a cup or spoon, and lastly by spreading it on with the hands, until the proper thickness is attained to give sufficient strength; and

in sections by the method of parting. A common way is to make only two sections, the smaller one embracing merely the crown of the head. This plan requires that the frame on which the bust was modelled shall be so constructed that it may be taken apart and removed by the hand, after the plaster is well set. After the mould has been carefully cleaned with water and a soft brush, the parts are put together and bound by a strong cord or rope, and the seams stopped on the external surface with cream of plaster. After this is set the mould is saturated with water. The bust is then cast by turning into the cavity successive batches of cream of plaster, at the same time turning the mould about in such a manner as to cause the plaster to run into all the lines and furrows, and to be deposited in sufficient thickness all over the interior surface. In this way a hollow cast is made without the use of a core. After the plaster is well set, the bust may be placed upon a table and the mould

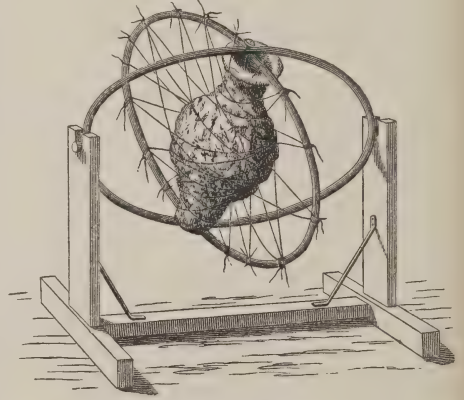


FIG. 21.—Machine for Casting a Bust.

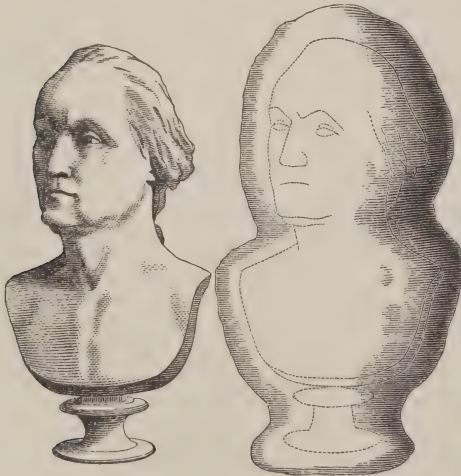


FIG. 20.—Bust covered with Plaster Mould.

then, after setting, the mould may be cut into sections with a very thin saw and carefully removed. (See fig. 20.) The process more usually preferred is to apply the plaster

chipped off with a chisel and mallet. This is an operation which requires great care, and can only be done by an experienced hand, and by none so well as by the artist himself. The casting of a bust is rendered much easier by swinging the mould in a pair of strong, concentric iron rings. (See fig. 21.) This device allows it to be turned with ease in any position, greatly facilitates the operation, and diminishes the chances of making a defective cast. The plaster bust is used as a model by the marble cutter in reproducing the work of the artist. When several copies in plaster are desired, it is used as a model on which to form a piece mould, which may serve in producing an indefinite number of copies. A statue in plaster may be cast in a variety of ways, depending upon the purpose for which it is intended; whether to be preserved as a plaster statue, or copied in marble, or to be used as a model from which to make a bronze cast. If it is to be preserved as a statue, it will be cast as nearly as may be in one piece; but if to be used as a model or pattern by the bronze founder, it

may either be taken in as many pieces as it is designed to make the bronze casting, or it may be cast in one piece, or in as few as possible and then joined together, leaving the bronze founder to make his selection of sections in which to take his loam mould. The method of proceeding to make a mould for a plaster statue from a clay model is as follows: The model is made pretty wet, so that the moisture from the plaster will not be too much absorbed before it sets. Then a mixture of plaster and water is spread over a certain selected portion of the statue, say the front half of the head and chest, a barrier of clay having been previously erected along the boundary line. After the plaster has set the clay barrier is removed, any injuries that may have happened to the back part of the head and chest are repaired, and the edges of the plaster soaped or washed with a mixture of clay and water. A plaster mixture is then spread over the back of the head and chest, the two applications encasing the whole body above the waist. The remainder of the body may be taken in two or four pieces. If one limb is partially raised or much separated from the other, it may taken in two halves by itself; but if not, the lower part of the body and both limbs may be moulded in two pieces, one before and one behind. Very often one arm will be taken with the chest, while the other one will be taken separately. After setting, all the pieces may be removed, and of course some of the clay will be brought away with them; but that is of no consequence if the plaster mould is a good one, because, with care, a copy is now secured. After removal, the separate pieces are cleaned with water and the careful use of a brush. The pieces may then be put together and the different parts of the statue cast in the same manner as a bust is cast. Measurements have been taken from certain points on the clay model to the dividing lines, and recorded. These points and lines are reproduced on the plaster casts, so that their edges may be cut to precisely fit each other and preserve the symmetry of the original model. The statue is then completed by putting all the parts together and cementing them with plaster mixture, which is spread on over the seams on the inside by the hand, introduced through an opening made for that purpose, which is afterward repaired in the same way. If a bronze copy is to be taken and the bronze founder prefers to have the pieces separate, of course the joining will not be done. In cases where the statue is clad to the throat, there will be one additional piece of work to be performed to prepare it for the bronze founder, which is to detach the head, and add plaster in a conical form to the neck, which is to be fitted into a collar; for the head should be cast separately in bronze, and the artist should separate it and fit it in its joint himself, so that the proper pose shall be preserved.—A statue in bronze is cast in two or more pieces, generally in from four to six, the number of pieces usually be-

ing in inverse proportion to the mechanical and technical skill of the founder. The principal difficulty in casting a statue whole is the cracking and straining of parts on cooling and contraction of the metal. If, however, this can be cast very thin, and uniformly so in every part, avoiding masses where there are folds of dress or any irregular surfaces, no cracking may occur. It is not always, however, desirable to avoid division, because the parts may be skillfully joined and much tedious labor saved. In the case of such a work as the statue of Pallas, shown in fig. 23, the whole figure, with the exception of the right arm and upper part of the spear, which are to be removed, may be cast in one piece. If of plaster, we will suppose the model to have been varnished with a solution of shellac in alcohol, previous to which it may have been painted with linseed oil and dried, to harden the surface; but this may have been omitted. The statue is laid upon some very fine loam in the iron flask in which it is to be cast, and well adjusted in a bed prepared for it, which fits its surface perfectly, giving a firm support. A quantity of fine loam, which is only to be obtained in a few localities, possessing peculiar physical properties, adhesive and yet porous, after having been ground several times in a mill resembling a sugar mill, is taken in small quantities at a time and pressed and hammered into compact sections upon the surface

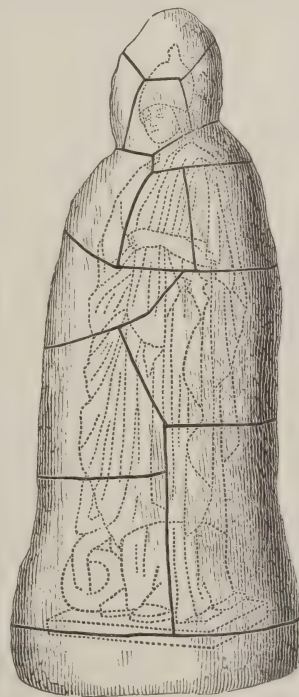


FIG. 22.—Piece Mould for a Statue.

of the model. Each section must embrace such parts as will allow of its being drawn. The process is similar to that of making a piece mould with plaster of Paris, except that the material in the latter case is spread on in a plastic condition, while the former is rammed and hammered on. The process is a very difficult and tedious one, requiring several weeks and sometimes months to make a mould for a life-size statue. In Germany a composition is used which is spread

on like plaster and allowed to harden. Whatever material is employed, the problem is to fit together firm but

porous sections over the whole surface, of such forms and dimensions as will be most convenient for drawing from the model, and also for supporting each other after the model is removed. (See fig. 22.) Iron rods and stays are placed in the section while they are being hammered together, and channels leading from the top to the bottom must be formed in them through which to pour the metal. They are represented in the sectional cut, fig. 24. After this loam piece mould is completed, a number of the sections are laid in a bed of loam in a flask, and the forming of the core is commenced within the cavity. It is made of the same material, a very fine loam, which was used for the outer mould, except that sometimes it has mixed with it a small portion of molasses or paste. It is hammered together in the same way, and when completed is a facsimile of the original model. It must contain an iron frame, or a number of iron rods, to strengthen it, and also some pierced tubing for carrying off the expanded gases which are generated in pouring. Iron rods must also be passed in two or more places through it, their ends entering and resting in the outer mould. When the latter has been carried up piece by piece and the hollow completely filled with the hammered loam, it is to be removed and the loam statue placed in the proper position, and its surface carefully pared down to a uniform depth. This forms the core, which is represented in fig. 23 by the



FIG. 23.—Statue and Core of Mould.

smaller statue. When placed within the outer mould and properly adjusted, there will be a space, equal in depth to the thickness of the paring, between every part of the surface

of the core and the inner surface of the outer mould. It will be observed that in this case the holes for pouring and for the escape of air are made at the base of the statue, which for

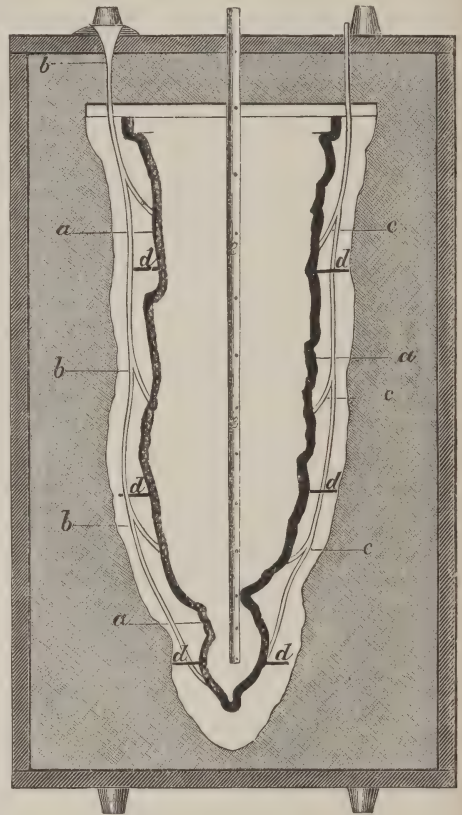


FIG. 24.—Perpendicular Section of Mould. *a, a, a*, Hollow mould. *b, b*, Channel in the cope for pouring the metal. *c, c*, Channel for discharging gases. *d, d, d, d*, Iron supports for holding core in place. *e, e*, Air tube in core.

casting is to be turned upside down. In casting statues in one piece, they are usually placed in this position. A perpendicular section through both outer and inner parts of the mould and the containing flask has the appearance represented in fig. 24, with the exception that the iron framework for strengthening the parts has been omitted. Both core and outer piece mould are now placed in the oven and baked, having previously been carefully dressed and cleaned, and then washed with a mixture of water and plumbago or charcoal, or both combined. After the proper amount of baking, which should leave them dry and porous, the parts are taken and placed together in a flask, each part of which contains a bed perfectly adjusted to the surface of the mould. The flask is then carefully secured with bolts to prevent any expansion or opening of the mould during the casting. Bronze containing 10 per cent. of tin requires a heat of about 2,000° F. to

bring it to the proper degree of fluidity. It is considered rather a refractory metal, liable to fly, and requires skill and experience for its mastery. The pouring is done in the same manner as for bell casting, and the same crucibles and furnaces are used. After the metal has cooled the flask is removed, the loam knocked off, and the branches of metal which fill the spaces of the air holes as well as those for pouring are cut off. When the statue is cast in sections the edges are made somewhat thicker than the other parts, and lips are also provided, to meet in the interior so that they may be bolted together. The thickness of the edges is for supplying material for hammering them together till the seams are obliterated. The parts are usually immersed for a few hours in a weak pickle of acidulated water, for the purpose of loosening and aiding in the removal of silicious matter which has become incorporated with the surface of the bronze. All the sections are then bolted together, the edges smoothly hammered till the joints are perfect, all roughnesses filed away, and the whole surface chased with appropriate tools. An old method, which is still employed in Italy, is to make a core composed of potter's clay, brick dust, cow's hair, or some other composition, and over this model the figure in wax. Then the outer mould is formed upon this, of some composition, of which loam forms the principal part. Iron rods for supports and tubes are provided and adjusted in the same way as in piece moulding. The whole is then dried and baked in an oven until the wax is melted and cleaned, and the mould rendered sufficiently porous.

CASTLEBAR, a town of Ireland, capital of county Mayo, at the N. end of a lake of the same name, 41 m. N. N. W. of Galway; pop. about 3,000. The principal street is a mile long, and it contains a square with handsome houses. It has a fine parish church, a Catholic chapel, a Wesleyan meeting house, several schools and hospitals, barracks for artillery and infantry, a court house, and a county jail. The principal trade is in agricultural products. Linen, linen yarn, and other articles are manufactured. The town was captured in 1798 by a French force under Gen. Humbert, who had landed at Killala bay; but they evacuated it shortly afterward, on the approach of the British under Lord Cornwallis.

CASTLE CAREY, a market town and parish of Somersetshire, England, on the Great Western railway, 22 m. S. S. W. of Bath; pop. in 1871, 5,518. It contains a manor house in which Charles II. took refuge after the battle of Worcester.

CASTLEMALIN, a town of Australia, in the colony of Victoria, situated at the junction of Barker's and Forest creeks, 65 m. N. W. of Melbourne; pop. in 1871, 7,308. In the early days of gold mining it was a place of great importance, the diggings in the neighborhood being among the first discovered in Australia. It is a principal station on the Victoria railway.

CASTLEREAGH, Robert Stewart, viscount and marquis of Londonderry, a British statesman, born at the family seat of Mount Stewart, county Down, Ireland, June 18, 1769, died by his own hand at his seat of North Cray place, Kent, England, Aug. 12, 1822. He attended the grammar school at Armagh, and completed his education at Cambridge. In 1789 he was elected to the Irish parliament for the county Down, after a sharp contest, which is said to have cost his family over £25,000. In 1794 he was returned to the British house of commons, as a member for the borough of Tregony. In May, 1796, he was again returned to the British parliament for Orford; but relinquishing his seat in July, 1797, he was re-elected to the Irish parliament, as representative of the county Down, and appointed keeper of the privy seal of Ireland. In 1796 he became Viscount Castlereagh, on the elevation of his father to the marquise of Londonderry. In the beginning of 1798 he became chief secretary to the lord lieutenant, and an Irish privy councillor. The rebellion which invited and accompanied the landing of Gen. Humbert in 1798 was crushed by Castlereagh. It was mainly through his instrumentality that the act of union was passed. When this measure was consummated, he quitted the Irish government, execrated by the majority of his countrymen. He represented his native county in the first imperial parliament, which assembled in February, 1801, and also in the second, which convened in September of the ensuing year. In the beginning of 1802 he was appointed a privy councillor of Great Britain, and president of the board of control. He retained that office after the retirement of Mr. Pitt, and throughout the Addington administration. In July, 1805, after Mr. Pitt's return to power, Castlereagh joined his cabinet as secretary at war and for the colonies. Having lost his seat for Down, he was returned in 1806 for Boroughbridge; and relinquishing his office after Mr. Pitt's death, he was returned for the following parliament, in the same year, for the borough of Plympton Earle. He now went into opposition against Fox and Grenville, and attacked their peace policy. In 1807, upon the formation of the Portland cabinet, he again became secretary at war, and was re-elected by his last constituency for the parliament which met in May of that year. While a member of this administration, he incurred in 1809 the responsibility of the ill-advised Walcheren expedition, in reference to which Mr. Canning, his colleague and secretary for foreign affairs, assailed him with such warmth of personality, that a duel ensued between them, and both retired from office. Castlereagh soon returned to the ministry, and assumed Canning's post, in which he gained a position so commanding, that on Mr. Perceval's death, in 1812, he was regarded as the ministerial leader in the house of commons. In November, 1812, he was once more returned for the

county Down, retaining that seat in the next two parliaments, which met in August, 1818, and in April, 1820. In 1814, as British plenipotentiary, he took part in the conferences of Châtillon, and was influential in persuading the allies not to lay down their arms unless Napoleon agreed to limit France to the boundary of 1792. This Napoleon refused to do; and that great campaign was begun which ended in the capitulation of Paris and the abdication of Napoleon. At first Castlereagh would not concur, in behalf of England, in the measure by which Napoleon was permitted to retain the title of emperor and retire to Elba. After the treaty was signed, however, he reluctantly acceded to it. He took part in the congress of Vienna, both before and during the hundred days. Subsequently he supported George IV. in his schemes for getting rid of Queen Caroline, and was the author of the harsh measures for the repression of discontent caused by general distress and dearth of provisions. The struggles of the constitutionalists in Spain and Portugal called for active interference on the part of the holy alliance, and Castlereagh was on the point of joining the congress of Verona when he fell into a state of melancholy, in which he committed suicide by opening the carotid artery with a penknife. The coroner's jury declared the act to have been committed in a state of lunacy. He had become second marquis of Londonderry, April 8, 1821. His correspondence was edited by his brother, the third marquis, in 1850.

CASTLETON, a post village and township of Rutland co., Vt., on Castleton river, at the intersection of the Rutland and Washington, and the Rensselaer and Saratoga railroads, 12 m. W. of Rutland; pop. in 1870, 3,243. It is noted for its slate quarries, and is the seat of a seminary and a state normal school.

CASTLETOWN, the capital of the Isle of Man, England, on a bay of the same name, near the S. extremity of the island; pop. in 1871, 2,373. It contains King William's college, founded in 1830, and Castle Rushen, said to have been built by a Danish prince in 960. It is the seat of the governor and the courts of law.

CASTOR, a substance somewhat resembling musk, secreted by the beaver. It is of the consistency of honey, and has a strong, penetrating, fetid, and volatile odor, which is lost when the substance is dried and hardened. It is used to some extent in medicine as an antispasmodic and stimulant; and is thought to act especially upon the nervous system. It was known and recommended by Pliny and Dioscorides, but it has not a high reputation among modern practitioners; and as it is often largely adulterated, there will be little cause for regret should its use be discontinued. The article considered the best is obtained from Russia. The American beaver produces an inferior quality. Benzoic acid is recognized among the numerous organic compounds of which this substance consists.

CASTOR OIL, a mild purgative obtained from the nuts of the castor oil plant, the *ricinus communis* or *palma Christi*. *Ricinus* is an apetalous genus of plants belonging to the natural order *euphorbiaceæ*. It was originally a native of Asia, and was used by the nations of antiquity, but is now naturalized in Africa, America, and the south of Europe. The characters of this genus are: Leaves alternate, stipulate, palmate, glands at apex of petiole. Flowers in terminal panicles; monœcious, no petals; calyx 3-5 parted, valvate; filaments numerous, polyadelphous; style short, stigmas 3, bipartite, feathery; ovary globose, 3-celled, with an ovule in each cell; fruit capsular, trilocular. The *R. communis* or *palma Christi* has peltate palmate leaves, with lanceolate serrated lobes; an herbaceous glaucous stem, of a purplish red color upward; and flowers in long green and glaucous spikes, springing from the divisions of the branches, the males from the lower part



Castor Oil Plant.

of the spike, the females from the upper. The capsules are prickly. It varies in size in different countries. In some parts of Europe it is not more than three or four feet high, but in India it is a tree, and in Spain it attains fair dimensions. The native country of *R. communis* is unknown; it is conjectured to be Barbary. The castor oil plant was known in very ancient times, both to the Egyptians and the Greeks. The latter called it *croton*, a name bestowed by modern botanists on another genus of euphorbiaceous plants, one species of which yields the strongly purgative oil called *oleum tiglii* or croton oil. Numerous varieties of *R. communis* exist in various localities, differing not only in color and the peculiar condition of the stem, but in stature and duration. In warm countries it is ligneous and perennial; in cold regions, annual and herbaceous. The entire plant possesses active properties, but the oil extracted from the seeds is alone employed in

Europe. The ancients administered the seeds entire, but their variable action, producing sometimes even fatal effects, led to their disuse. The oil is of comparatively recent introduction. The seeds were formerly known in the shops as *semina ricini* or *semina cataputia majoris*. They are about the size of a small bean, obtuse at both ends, the surface being smooth, shining, and beautifully marbled. The skin consists of three tunics; the nucleus or kernel consists of an oily albumen and an embryo, the cotyledons of which are membranous or foliaceous. The outer shell is devoid of taste. According to Dr. Dierbach, the active principle resides in the inner coat; others assert that the purgative principle resides in the embryo. Mérat and De Lens have shown in the *Dictionnaire des sciences médicales*, t. xlix., that the active principle is diffused through the entire substance of the kernel, though possibly with more intensity in the embryo.—The quality of castor oil depends on the greater or less maturity of the seeds, the peculiar variety of the plant from which they have been obtained, and the accidental or intentional admixture of other seeds before the process of extraction. Both in India and America much heat was formerly employed in the process, and this was injurious to the quality of the oil. During the application of heat a volatile principle escaped, which was so irritating that the workmen had to protect their faces by masks. The French method is the best. The fresh seeds are bruised, and then put into a cold press. The oil is expressed and allowed to stand some time, to permit the albumen, mucilage, and other matters to subside; or it is filtered, to separate them more rapidly. The produce is equal to about one third of the seeds employed, and the oil possesses all its natural qualities. Both the French and Italian oils are much milder than oil procured from tropical countries. Oil of good quality is a thickish fluid of a very pale yellow color, the best being almost limpid, with a slightly nauseous odor and an oily taste, mild at first, but causing a feeling at the back of the throat, more or less intense, according to the freshness of the specimen. Bad oil is rancid and disagreeable. Castor oil is much used in the East, France, Italy, and other countries, for burning, as well as for medicinal purposes.—The cathartic action of castor oil seems to depend upon the development of an acrid principle, identical with or analogous to that of croton, modified by the much larger amount of bland oil with which it is associated. When pure, it is a mild and certain aperient or laxative, commonly operating without griping or other inconvenience, very soon after it is taken. It is deemed the most proper laxative in many inflammatory states of the abdomen, the kidneys, and the bladder. It is also deemed a most eligible medicine in piles and other affections of the rectum. Its use is liable to be followed by more or less constipation. The chief objection to its use is its repulsive taste.

From 15 to 20 drops of pure liquor potassæ will usually saponify half an ounce of castor oil, to which one ounce of distilled water and a drachm of spirits of pimento or of nutmeg may be added. This makes an emulsion which is effective and not unpleasant to the taste. The manufacture of castor oil is actively carried on in the United States, especially at St. Louis, the beans being produced in southern Illinois.

CASTOR AND POLLUX, called also the DioscURI, or sons of Zeus, famous heroes in Greek mythology. According to Homer, they were sons of Tyndareus and Leda, and brothers of Helen and Clytemnestra, and hence are often called the Tyndaridæ. Castor excelled in taming horses, and Pollux in the game of boxing. Though buried, they were taken from the earth before the siege of Troy, became immortal and honored as gods, and sometimes appeared among men. The legend was compli-



Castor and Pollux.

cated by subsequent poets. According to some, the DioscURI were sons of Leda and of Jupiter disguised as a swan or a star; according to others, Pollux only had this divine origin and the privilege of immortality. The place of their birth was variously said to be Amyclæ, Mount Taygetus, and the island of Pephnos. They are fabled to have attacked and ravaged Attica, and to have brought back their sister Helen, who had been stolen away by Theseus. They took part in the Calydonian boar hunt, and accompanied the expedition of the Argonauts, during which Pollux vanquished with the cæstus the giant Amycus, king of the Bebryces, and founded the city of Dioscurias in Colchis. Associated with Idas and Lynceus, sons of Aphareus, they plundered Arcadia; but in a quarrel which arose concerning the division of the spoil, Castor, the mortal, perished by the hands of Lynceus, who in his turn fell under

the blows of Pollux, while Idas was struck with a thunderbolt by Jupiter. According to another tradition, Castor was slain in a war between Athens and Lacedæmon. Jupiter permitted Pollux to pass alternately one day with his brother on Olympus and another on the earth. The worship of these brothers was established by the Achæans, adopted by the Dorians, and spread throughout Greece, Italy, and Sicily. They were the tutelary gods of hospitality, presided over gymnastic exercises, and were eminently the mighty helpers of man. They calmed tempests, appearing as light flames on the tips of the masts. They sometimes appeared in battle, riding on magnificent white steeds at the head of the army. By their assistance the Romans believed themselves to have gained the battle of Lake Regillus. Placed among the stars, they became the constellation Gemini. In works of art they are usually represented as young horsemen in white attire, with a purple robe, armed with the lance, and wearing a helmet crowned with stars. At Rome the men swore by the temple of Pollux, *Ædopol*, and the women by that of Castor, *Æcastor*. Around the ancient temple consecrated to them in the forum the equites marched in magnificent procession every year on July 15.

CASTOR RIVER, a stream of S. E. Missouri, which rises in St. François co., flows S., communicates by several arms with a group of small lakes in Stoddard co., and afterward unites with the Whitewater river. The stream thus formed, which is sometimes called the Castor, but more frequently the Whitewater, flows through a low swampy region, in which most of the streams spread themselves over a large surface and form extensive marshes or lakes. It receives the outlet of Lake Pemisco, and finally discharges itself into Big lake.

CASTRATION, a surgical operation practised upon some of the domestic animals, which consists in taking away the necessary and essential organs of reproduction, namely, the testicles in the male or the ovaries in the female. When performed upon the female, the operation is more commonly known as spaying. The object to be accomplished in either case is to moderate the impetuosity of the animals, to render them more docile and submissive, or more adapted to the kind of labor required of them, to increase their size, or to dispose the system to the accumulation of fat. The advantages which it sometimes confers in these respects are, however, often more than counterbalanced by other effects. Thus it undoubtedly diminishes the activity, the courage, the endurance, and even the intelligence, or at least the quickness of its manifestation. It is not therefore an operation to be performed on all animals, even of the male sex, indiscriminately, but should be applied with judgment only to those cases in which it is required by the special conditions, the particular employment, or the peculiar natural disposition of the animal. Castration may be performed at all ages; but its effects are

more decided if performed before than after the age of puberty. In the first case, the animal never arrives at the usual fully developed adult condition, and, if of the male sex, does not acquire the external marks which distinguish him from the female, nor the general masculine bodily contour. On the other hand, if these sexual characters have already been developed, they do not disappear on castration, and the animal simply loses the power of reproducing his species. (See EUNUCH.)

CASTRÉN, Matthias Alexander, a Finnish philologist, born at Tervola, Dec. 2, 1813, died in Helsingfors, May 7, 1852. He devoted himself to collecting the monuments of the genius of Finland scattered through the various tribes, and as a preparation he undertook in 1838 to travel on foot through Finnish Lapland. He then visited Karelia, to make himself more familiar with the language, with a view to the translation into Swedish of the celebrated popular poem, the "Kalevala." Aided by government, he pursued his investigations through Norwegian and Russian Lapland, and even through the land of the Samoyeds of Europe and Siberia. He was appointed linguist and ethnographer to the academy of St. Petersburg, and with the aid of the university of Helsingfors he extended his researches throughout Siberia, from the frontiers of China to the shores of the Arctic ocean. With feeble constitution and delicate health, he accomplished extraordinary labors, and sent home, in addition to the documents connected with his own studies, reports and letters of great value. Many of these were published in the Russian and Swedish periodicals of the day. Castrén was honored on his return to his country, in 1851, a year before his death, with the office of first professor of the Finnish language and literature at the university of Helsingfors. The literary society of Finland and the academy of St. Petersburg caused his writings to be published after his death, the latter body appointing Schiefner as editor of the works, published in St. Petersburg in German in 1853 and 1856, while Finnish editions were brought out at Helsingfors in 1852, 1853, and 1855, and a German edition of part of them appeared also in Leipsic. Among his works are *Elementa Grammaticæ Tschermissæ*, *Elementa Grammaticæ Syrjænæ*, *De Afficiis Personalibus Linguarum Altaicarum*, and an Ostiak grammar in German. His Samoyed grammar and dictionary were published in St. Petersburg in 1854 and 1855, and his Tungusian dictionary in 1857. Borg published in 1853 a biographical sketch of Castrén, and a monument has been dedicated to his memory at Helsingfors.

CASTRES, a town of Languedoc, France, department of Tarn, 20 m. S. E. of Albi; pop. in 1866, 21,357. It lies in a fertile valley on both sides of the river Agout, which is here crossed by two stone bridges. It is the seat of a Protestant consistory, having been one of the first towns to embrace the doctrines of Calvin. It

is noted for its fine wool-dyed cloths, and has manufactures of silk, woollen, and cotton goods, linen, paper, soap, &c. Castres was a flourishing place in the 12th century. It suffered much in the religious wars of the 16th century, and its fortifications were destroyed by Louis XIII. in 1629. It was long the residence of Henry IV. during his religious wars.

CASTRI. See DELPHI.

CASTRIOT, George. See SCANDERBEG.

CASTRO, Henry, a Texan pioneer, of Portuguese descent, born in France in 1786, died in Monterey, Mexico, in 1861. He was an officer of the Paris national guard in 1814, and after the overthrow of Napoleon came to the United States, where he was naturalized, and appointed in 1827 Neapolitan consul at Providence, R. I. In 1838 he went to Paris as a partner in the banking house of Lafitte, and in 1842 he became consul general in that city of the republic of Texas. Having received a grant of land on the banks of the Medina river, he began in 1840 to send out emigrants to Galveston; and though the first attempt was unfortunate, he succeeded in 1844 in establishing a settlement on the site of the present town of Castroville; and in the next two years he founded Quihi and Vandenberg. The number of his emigrant vessels amounted in 1846 to 26, which brought over 485 families and 457 single persons, chiefly Alsatians. In 1847 he founded Dhanis. All his settlements subsequently constituted Medina county, with Castroville as the capital.

CASTRO, Ines de, wife of the crown prince Dom Pedro of Portugal, assassinated in 1355. She was a daughter of Dom Pedro Fernandez de Castro, a descendant of the royal house of Castile, and a maid of honor to Constantia, first wife of Pedro. After Constantia's death in 1344, Pedro, fascinated by the extraordinary beauty of Ines, contracted a secret marriage with her, which, when a few years afterward it was disclosed to his father Alfonso IV., met a violent opposition from the king. The apprehension that the children of Ines might interfere with the claims to the throne of Pedro's children by his first wife, also preyed upon the mind of Alfonso. Her death was therefore resolved upon by the king, who caused her to be assassinated while Pedro was on a hunting excursion. When Pedro came home and found the bleeding corpse of his wife, his mother and the archbishop of Braga succeeded with the greatest difficulty in restraining him from taking vengeance upon the king. After the king's death in 1357 his wrath broke out with increased fury. One of the assassins succeeded in escaping to Aragon. The other two, who had sought protection at the court of Pedro the Cruel in Castile, were surrendered to the king of Portugal, who, after subjecting them to torture, had their hearts torn out, their bodies burnt, and their ashes scattered to the winds. He convened a council at Castanheda, when, in the presence of the nobility and the court, he produced the

papal documents and the evidence of the archbishop of Guarda, the attending priest, in order to establish by irrefragable proof the legitimacy of his marriage with Ines. The remains of Ines were then exhumed, her corpse was put upon the throne, clothed with the insignia of royalty, and the dignitaries of the kingdom approached to kiss the hem of the royal garment. Ines was afterward buried with great pomp at Alcobaça, the king, the bishops, the lords and officers of Portugal following the funeral procession on foot, a distance of 60 miles. A superb monument was dedicated to her at Alcobaça. Gomes in Portugal, Count Soden in Germany, and Feith in Holland have founded tragedies upon the incidents of Ines de Castro's life; but the most remarkable tribute paid to her memory is that of Camoëns in the "Lusiad."

CASTRO, João de, a Portuguese naval hero and explorer, born in Lisbon in February, 1500, died in Goa, June 6, 1548. He belonged to an ancient family, and early became proficient in mathematics, having as teacher Pedro Nunez, and as fellow student the infante Dom Luis. He accompanied the latter in the expedition to Tunis in 1533, after having been previously knighted by the governor of Tangier; a similar honor was offered to him at Tunis by Charles V., but declined. In 1538 he was made commander of a small religious order, and soon afterward went with his uncle to Goa, where he served against the Moors. In 1540 he explored the Red sea under Estevão da Gama; in 1543 he was placed in command of a naval expedition for the extirpation of piracy; and in 1545 he was appointed councillor of the crown and governor of Goa. In 1546 he gained a celebrated victory over the Moors at Diu, and was celebrated by Camoëns as *Castro forte* (the powerful Castro). The king of Portugal, though never partial to him, appointed him viceroy of India, Oct. 13, 1547. He died soon afterward in the arms of St. Francis Xavier, and a statue was erected in his honor at Goa. His remains were removed in 1576 to Portugal, and deposited with great pomp in the convent of Bemfica. His MS. log book (*Roteiro*) of his hydrographical investigations in the Red sea, preserved in the British museum, was first published in Paris in 1833, and possesses great scientific merit. He left also MS. narratives of his voyage from Lisbon to Goa, and from Goa to Diu. His biography was published in Lisbon in 1651, by Jacintho Freyre de Andrada.

CASTRO DEL RIO, a town of Spain, on the Guadajoz, in the province and 16 m. S. E. of Cordova; pop. about 9,000. The ancient part of the town is surrounded by a dilapidated wall with towers. The entrance is by a single gate, once defended by an Arab castle, now in ruins. The modern portion is outside the walls, and is well and handsomely built. There are two colleges and several schools, convents, chapels, and hospitals. It has manufactures of woollen and linen fabrics, and earthen ware, and a trade in wine, wheat, cattle, oil, honey, &c.

CASTROGIOVANNI, or **Castro Giovanni** (anc. *Enna*, from one form of the name of which, *Castrum Ennae*, corrupted by the Arabs to *Cassar Janna*, the modern designation comes), a city of Sicily, in the province and 13 m. N. E. of Caltanissetta; pop. about 15,000. It is situated on the level summit of a precipitous

and rocky height in the centre of the island, 4,000 ft. above the sea, and is the highest inhabited site in Sicily. Its situation rendered it in ancient times one of the strongest natural fortresses in the world, and during the middle ages it bore the name of *VInespugnabile* (the Impregnable). The appearance of the mod-



Castrogiovanni.

ern town is mean and wretched; the dwellings are generally dilapidated, and have a dingy and stained appearance largely attributable to climatic influences. The old feudal fortress of Enna, erected in the 13th century by Frederick II. of Aragon, is the chief edifice. The height of Enna was the fabled birthplace of Ceres, and the site of her most famous temple. About 5 m. distant is the lake of Pergusa, where Proserpine, according to the poets, was carried off by Pluto. During the first servile war, about 100 B. C., the insurgent slaves made Enna their headquarters.

CASTRUCCIO-CASTRACANI, a leader of the Ghibellines in Italy, born in Lucca about 1282, died Sept. 3, 1328. He was a member of the noble Antelminelli family, and in childhood was banished with his relatives by the Guelphs. His military exploits in France, England, and Lombardy led to his being placed at the head of the Ghibellines in Lucca; but his ally, Ugucione de la Faggiola of Pisa, after having aided him in putting down the Guelphs, sacked Lucca, and put him in prison, from which he was released by the people rising against Ugucione and expelling him and his followers. Castruccio was elected governor of Lucca, and during the 15 years of his administration was engaged in warfare with Florence, with a view of establishing his supremacy over the Ghibellines of Tuscany. Louis IV., emperor of Germany, rewarded his services by investing him with

the rank of duke of Lucca, count of the Lateran, and Roman senator; but Pope Boniface VIII. resented his victories over the Guelphs by excommunicating him shortly before his death. Nicolò Negrini (Modena, 1496), Wieland (Leipsic, 1779), and Manuzzi (Rome, 1820) have published works relating to him; but the most celebrated is that by Machiavelli (French translation by Dreux du Radier, *La vie de Castruccio-Castracani*, Paris, 1753).

CASVEEN. See **CASBIN**.

CASWALL, Henry, an English clergyman and author, born at Yateley, Hampshire, in 1810, died in January, 1871. He was the son of a clergyman, received his early education in England, and subsequently went to the United States. He received the degree of B. A. at Kenyon college, Ohio, in 1830, and that of M. A. in 1834, and was ordained in 1837 by the bishop of Indiana. He was engaged as minister and professor of theology in the United States and Canada till 1842, when he returned to England. The disabilities of his American ordination were removed by a private act of parliament, and in 1848 he became vicar of Figheldean, Wiltshire, and subsequently proctor in convocation for the diocese of Sarum, and prebendary of Salisbury cathedral. In 1854 he received the degree of M. A. from the university of Oxford, and on revisiting the United States in the same year that of D. D. from Trinity college, Hartford. He published

"America and the American Church" (1839), "City of the Mormons" (1842-'3), "Scotland and the Scottish Church" (1853), "The Western World Revisited" (1854), and other works.

CASWELL, a N. county of North Carolina, bordering on Virginia; area, 400 sq. m.; pop. in 1870, 16,081, of whom 9,494 were colored. It is intersected by Hycootee river and County Line creek, affluents of Dan river. The surface is undulating, and the soil fertile. The Richmond, Danville, and Piedmont railroad crosses the N. W. corner. The chief productions in 1870 were 80,597 bushels of wheat, 237,257 of Indian corn, 93,646 of oats, and 2,262,053 lbs. of tobacco. There were 1,543 horses, 2,126 milch cows, 1,984 other cattle, 2,765 sheep, and 9,175 swine. There were 5 manufactories of carriages and wagons, 2 of iron castings, 2 of chewing tobacco, and 9 flour mills. Capital, Yanceyville.

CASWELL, Richard, an American revolutionary general and statesman, born in Maryland, Aug. 3, 1729, died Nov. 20, 1789. In 1746 he removed to North Carolina, where in 1754 he became a member of the colonial assembly, in which he continued to hold a seat till 1771. He was then chosen speaker of the house of commons, and colonel of the county militia, and at the outbreak of the revolution identified himself with the patriots. He soon after became treasurer of the state. In 1776, in command of a regiment of minute men, he defeated the loyalists at Moore's creek, and for this service was appointed brigadier general. For three years he was president of the provincial congress which framed the state constitution, under which he was elected the first governor. He was engaged in the disastrous battle of Camden in 1780, became comptroller general of the state in 1782, and was again elected governor in 1784, to which office he was twice reelected. In 1787 he was a delegate to the convention assembled at Philadelphia for the formation of the federal constitution; in 1789 he was speaker of the state senate, and he was subsequently one of the convention by which the federal constitution was ratified in North Carolina. He was presiding in the senate when he was struck with fatal paralysis.

CAT, a general name for animals of the genus *felis* (Linn.), which comprises about 50 species of carnivorous mammalia, the characters of which are closely assimilated, and at the same time widely different from other genera. It is characterized by six incisor teeth above and below; two canine teeth in each jaw, powerful and formed for tearing; molar or cheek teeth, four in the upper jaw and three in the lower, thin, pointed, and wedge-shaped, formed for cutting. The head is large, round, and wide; the eyes have the pupil often oblong; the tongue has strong horny papillæ, directed backward. The feet are formed for walking; the toes are five in number on the fore feet and four on the hind feet, armed with strong, sharp, and hooked claws, retracted when the animal

walks. The intestines are very short, as in all animals living almost exclusively on animal food. The animals composing this genus (which includes the lion, tiger, panther, &c.) are the most powerful and ferocious of all predatory quadrupeds, as the eagles and birds of prey are among the feathered tribes. The different species are distributed over every portion of the globe, with the exception of Australia and the South Pacific islands; but the most formidable are found in the warmest climates; no species has been discovered common to the old and the new world. The favorite resorts of these animals are the thick forests of the tropics, where they lie concealed during the day, and prowl at night in search of prey; the more northern and smaller species prefer rocky and well wooded situations. The cats hunt a living prey, which they secure by cunning and watchfulness, springing upon their unsuspecting victims from an ambush, or stealthily crawling up to them. Some species, as the leopard and jaguar, pursue their prey into trees. The cougar lies in wait on a branch or overhanging rock, and falls upon animals passing beneath. Their aspect is ferocious, their instincts bloody, and their strength great; even their voice has something in it harsh and terrible. The anatomical structure of the cats is indicative of great strength and activity; the jaws are very powerful, bearing teeth shaped like wedges, thin and sharp, requiring but little force to cut through the flesh on which they feed; the structure of the joint admits of no lateral motion, and the whole force of the immense temporal and masseter muscles is exerted in a perpendicular or cutting direction. To assist in tearing their food, the surface of the tongue is covered with numerous horny papillæ; these may be felt, on a small scale, on the tongue of the domestic cat; the tongue is rather an organ for removing muscular fibres from bones, and for retaining flesh in the mouth, than an organ of taste. The neck, shoulders, and fore limbs display a remarkable muscular development; the lion can drag away with ease cattle and horses which it has killed; a single blow of the fore limb of a Bengal tiger has been known to fracture a man's skull. The mechanism by which their claws are retracted and prevented from being blunted during walking is as follows: the claw itself is supported on the last bone, which consists of two portions united to each other at nearly a right angle; the articulation is at the upper end of the vertical portion, while the flexor tendons are attached to the other portion; the action of these muscles causes the whole bone to move through an arc of 90° round the end of the second bone. In the state of rest the claw is kept retracted by a slip of the extensor muscle, and by elastic ligaments; in the state of action, the strong tendon of the flexor, with its circular sweep, protrudes the claw with prodigious power.—The domestic cat is generally believed to have sprung from the Egyptian cat (*felis maniculata*, Rüppell), a native of the north of Africa.

This species is 2 ft. 5 in. long, of which the tail measures 9 in.; the height at the shoulder is 9½ in.; in size it does not differ from the domestic cat. The color above is an ochry gray, with a darker line along the back; beneath, grayish white; on the forehead are eight slender black lines, running forward to the upper part of the neck; the cheeks, throat, and front of the neck are pure white; two lines of an ochre-yellow color, one from the outer corner



Egyptian Cat (*Felis maniculata*).

of the eye, and the other from the middle of the cheek, meet under the ear, and two rings of the same color encircle the white of the neck; the limbs have five or six blackish semi-circular bands; the heels and wrists are black; the tail is slender, and has two dark rings at the tip. There is no doubt that this species is the original of the domestic cat of the ancient Egyptians, as is shown by the representations of cats on their monuments, by mummies, and by the skeletons found in their tombs. It may be a question whether this domesticated species was transferred by them to the ancient nations of Europe. There certainly is often met with, in modern times, a grayish white cat possessing the most striking resemblance to the Egyptian species; others of our domestic cats resemble the wild species of Europe. It is probable therefore that, as with all our domestic animals, different nations have domesticated different small kinds of native cats, which have produced, by the intermixture of their closely allied species, the numerous varieties now observed. At the same time it should be remembered that the whole genus *felis* is susceptible of considerable variation; slight variety of color, therefore, does not necessarily imply diversity of origin. Temminck and Rüppell are of the opinion that the *F. maniculata* is the species from which our domestic cat has sprung; before them most naturalists believed that the wild cat of Europe was the original stock; it is altogether probable that the domesticated species has been crossed in many instances by the wild cat, as shown by the short legs and thick short tails of some varieties. All the small species of cats might be easily domesticated, though the common Egyptian species seems to be the only one generally employed in household economy. The domestic cat readily returns to a wild state; neglect,

insecurity of their young, or favoring circumstances, drive or tempt them to the woods, where they prowl and hunt, and breed, in the manner characteristic of the genus. Cats, though they prefer flesh, will eat bread, fish, insects, and almost anything that is eaten by man. As a general thing, they have a great dislike to water, and will rarely enter it for the purpose of catching fish, of which they are extremely fond. They are capable of very strong attachment to man, and to animals reared with them. Among the most remarkable varieties of the domestic cat are the Maltese or Chartreuse cat, of a bluish gray color; the Persian cat, with long white or gray hair; the Angora cat, with very long and silky hair, generally of a brownish white color; and the Spanish or tortoise-shell cat, the most beautiful of all. In Cornwall and the Isle of Man a breed of cats without a tail is quite common, analogous to a similar and more common breed



Manx Cat.

of dogs.—The common wild cat (*F. catus*, Linn.) is the only animal of the genus that inhabits the British islands, where it is still not uncommon in the wild districts of Scotland and Ireland; it is found in the wooded tracts of the European continent. The length of the wild cat is 33 in., the tail being 11 in. The fur is long and thick, but not shaggy; the color varies from a yellowish to a blackish gray, darkest on the back, where it forms a line, diverging into four on the neck and head; the sides are brindled with broad, dark, but indistinct bands; the legs have two or three black bars,



Wild Cat (*Felis catus*).

running transversely upward; the tail is thick, with black rings, indistinct toward the base, and a black tip. The wild cat is an active

climber; its food consists of small animals and birds; its depredations among game are frequently very great. There are no long-tailed wild cats in North America; the animal called wild cat here is a species of lynx. (See LYNX.) The catamount is the cougar of authors. (See COUGUAR.) There are several small species of cats in the East Indies: the Sumatran cat, *F. minuta* (Temm.) and *F. Javanensis* (Horsf.); the Bengal cat, *F. Bengalensis* (Desm.); Diard's cat, *F. Diardii* (Desm.); and the Nepal cat, *F. Nepalensis* (Horsf.).

CATACOMBS (Gr. *katá*, downward, and *κρυβος*, a hollow place), subterraneous places for burying the dead. The catacombs of Egypt, from their vast extent and elaborate decorations, both of architecture and painting, are perhaps more remarkable than any others. The entire chain of mountains in the neighborhood of Thebes is mined by an immense number of these subterranean tombs. Those of the Theban kings, originally 47 in number, are the most ancient of all, some having been begun 4,000 years

ago. Most of them have been defaced, but a few still exist to bear witness to their pristine magnificence. They occupy a deep ravine, flanked by the bed of a torrent in the centre of the mountain Libycus, and, lying some 6,000 to 7,000 paces from the banks of the Nile, were reached by an artificial passage. Proceeding along the valley, the visitor discovers openings in the ground, with a gateway in a simple square frame, each gateway being the mouth of a gallery leading to the royal sepulchre. Forty paces within is another gateway opening to a second gallery 24 ft. in length, and on each side of this are small chambers. A third gallery succeeds, communicating with a chamber 18 ft. square, and from this is an entrance to another gallery 64 paces in length. This in its turn connects with several small apartments, beyond which lies a saloon 20 ft. square, containing the royal sarcophagus. The whole extent of excavation in this single tomb is upward of 225 paces. All the sarcophagi of the kings have long since been violated, and the bodies



The Catacombs of Thebes, Egypt. (From a Photograph.)

destroyed, doubtless for the sake of plunder; but M. Denon, the French traveller, found the fragments of a mummy in one of the royal tombs. Robbed as they have been, these tombs still preserve their wonderful paintings, after in some cases a lapse of 4,000 years. The more costly of the catacombs are covered in the whole extent of their interior by hieroglyphics and pictures, generally in fresco; and in all, unless wantonly injured by the Arabs, the colors are as fresh as if laid on but yesterday. The catacombs of the opulent Thebans were lower on the mountain than the royal sepulchres, and in proportion to the extent of their excavations they are more or less richly decorated, the hues of the paintings are brilliant, and the sculptures elegantly defined. Innumerable subjects are displayed in these tombs, one chamber being devoted to warlike representations, and another to husbandry or agriculture. Every ordinary occupation or amusement is exhibited, hunting, fishing, feasting, &c. Many of the figures are colored yellow on a blue ground,

exhibiting homage paid to monarchs, executions, religious or funeral processions, and in short every phase of human life. In some of the scenes gangs of African negro slaves, colored black, and accurately drawn in all leading characteristics, such as thick lips and woolly hair, are represented. In a group of a double file of negroes and Nubians, bound, and driven before the chariot of Rameses II., at Ipsambul, are delineated with perfect accuracy all the characteristics of the modern Ethiop. The paintings in the Egyptian catacombs also exhibit figures of colossal or pigmy size, as well as hawk-headed and fox-headed deities. The complete history of the ancient Egyptians may be read in these paintings, as every action of their lives is represented, with accompanying furniture, even down to the playthings of infants. "The Manners and Customs of the Ancient Egyptians," by Sir Gardner Wilkinson (5 vols., London, 1847), contains many hundreds of drawings and colored plates directly copied

from these extraordinary frescoes, and makes the reader so intimately acquainted with the daily life of an extinct people, that he seems actually to dwell among them. The catacombs for the poor were limited in space, rude in construction, and unadorned. In consequence, the mummies were packed together as closely as they could be laid, tier on tier, leaving a narrow passage between the walls of bodies.—For nearly the whole period of the Christian era have the Roman



Catacombs of St. Thraso and St. Saturninus, Rome.

catacombs attracted the interest of Christians, more especially during the last few centuries. Connected as they were with the trials of the early martyrs of the church, their exploration and history has ever proved one of the favorite branches of research. Many of them are of great antiquity, having been originally quarries hewn long before the Rome of Romulus and Remus was founded, and so extended in the course of time, that every one of the seven hills on which the city stood was perforated and honeycombed by passages, dark galleries, low corridors, and vaulted halls, where sunshine never enters. The light and soft nature of the material to be quarried greatly facilitated the work, and allowed the workmen to shape their shafts and galleries as they pleased; the excavations being made in the soft volcanic *tufa* and *pozzolano*, another volcanic substance even softer. As the extent and wealth of the city increased, new quarries were continually opened, even miles from the banks of the Tiber, and continued to be sought through the reigns of the Cæsars, until the empire began to decline, and old edifices were resorted to as materials for new ones. None of the ancient writers have left any account of the uses of these recesses when they were no longer quarried; but Horace, speaking of the caverns under the Esquiline hill, says: "This was the common sepulchre of the miserable plebeians." During the time of the persecutions of the Christians, commencing with that under Nero, and followed by those of Domitian, Trajan, Hadrian, Severus, Maximinus, to what is called the 10th and last persecution, which began in A. D. 303, under Diocletian, the catacombs were crowded with those for whom there was no

safety in the face of day. It is conjectured that many of these sufferers were aided in obtaining secure hiding places by the workmen in these caverns, who were well acquainted with their intricacies, and who became themselves early converts to the new faith. Some modern writers, however, maintain that though the quarries were used to some extent as sepulchres, it is yet evident that the greater part of the catacombs were originally constructed as places of interment for the dead. They are found in every direction outside the walls of the city, to the number of about 60 in all. They are mostly within a circuit of 3 m. from the walls, the furthest, that of St. Alexander, being 6 m. distant. Each catacomb forms a network of passages or galleries, intersecting each other generally at right angles, but sometimes diverging from a centre. These galleries are usually 8 ft. high by 3 or 5 ft. wide. The graves are in tiers on the sides, and when undisturbed are found closed with marble slabs or tiles, on which are often inscriptions or Christian emblems. It is calculated that the entire length of the catacombs is not less than 580 m., and that they contain about 6,000,000 bodies. It was not until the year 1377, when the papal seat, which for nearly 70 years had been at Avignon, was restored to Rome, that the catacombs appear to have attracted any serious attention from the government or the clergy. This was doubtless owing to the frightful state of society, which for some centuries after the extinction of the Western empire rendered Rome little better than a robbers' stronghold, and finally forced the pontiff to flee from the Tiber and seek an asylum on the banks of the Rhône. At this period the catacombs, from having been the habitations of persecuted Christians, were thronged with outlaws and assassins; but as the papal authorities acquired strength, many of them were driven out and the entrances to many of their retreats were closed. About 1535, under Pope Paul III., some few of the most remarkable of the crypts were explored, cleared, and lighted by lamps. A deep interest in subterranean Rome having thus been awakened, Father Bosio, a humble priest, but an enthusiastic antiquary, spent more than 30 years of his life in digging and groping in the catacombs; he cleared the way into some of the innermost recesses, which had been blocked up for centuries, and made drawings of the ancient monuments, inscriptions, paintings, sculptures, lamps, vases, &c., found underground. He did not live to see his work published, as he died (1629) while writing the last chapter; but it appeared in 1632, edited by Father Severani, and under the title of *Roma sotterranea*. It was translated into Latin by Father Aringhi, and still forms the most important work on the Roman catacombs. He was followed by Father Boldetti, who also spent more than 30 years in his subterranean research, and published in 1720 a folio volume, entitled "Observations on the

Cemeteries of the Holy Martyrs and Ancient Christians of Rome." This work is exceedingly valuable. These two enthusiastic and meritorious priests have been succeeded by such investigators as Bottari, Marangoni, Lupi, Fabretti, Filippo, Buonarrotti, Allegranza, &c. Seroux d'Agincourt is one of the most distinguished authorities of modern times; he went to Rome in the latter part of the last century to study Christian archæology and remain there for six months, but he became so interested in his inquiries that he stayed nearly 50 years. His great work, *Histoire de l'art par les monumens, depuis sa décadence au 4^e siècle jusqu'à son renouvellement au 16^e*, treats of the catacombs with profound learning and discrimination. Among more recent works is the magnificent one published at the expense of the French government, *Les Catacombes de Rome*, by Louis Perret (Paris, 1853); and in English, those of the Rev. Spencer Northcote, "The Roman Catacombs" (London, 1859), and "Roma Sotterranea" (London, 1869). The distinguished Roman antiquary, the chevalier de' Rossi, is preparing for publication a complete collection of all the Christian inscriptions, amounting to upward of 11,000, of which one vol. folio appeared in 1861. The same author is engaged upon a general work under the title of *Roma sotterranea cristiana*, of which vol. i. appeared in 1866. Among other recent writers of importance on the Roman catacombs may be mentioned Maitland, "Church in the Catacombs;" Kip, "The Catacombs of Rome;" Schaff, Rémusat, Jehan, Martigny, and Bouix. Under Pius IX. their exploration has been carried on with much intelligence and energy, and has resulted in many interesting and valuable discoveries. A full statement of these researches since November, 1871, is given in De' Rossi's *Bollettino di Archeologia*, new series, No. IV. When Bosio's discoveries were made known Pope Clement VIII. took the catacombs under his special protection, and decreed excommunication and severe corporal punishment against any one who should enter them without

leave, or remove from them the least object whatsoever. So highly were the virtues of the Christian martyrs esteemed, that personages of the highest distinction were buried in the catacombs, and were happy if they thought that after their death such honor should be paid to their remains. Among illustrious men thus entombed were the popes Leo I., Gregory the Great, Gregory II. and III., and Leo IX.; and the emperors Honorius, Valentinian, and Otho II.—The catacombs of Naples have larger and higher chambers and galleries than those of Rome; they are excavated in the volcanic tufa in the face of the hill of Capodimonte, forming a long series of corridors and chambers, arranged in three stories communicating with each other by steps. The only entrance now open is that of the church of San Gennaro. Their construction has given rise to many speculations among the antiquaries of Naples, but is now generally ascribed to the colonists from Greece. Subsequently they were used by the early Christians for purposes of sepulture as well as of worship. St. Januarius and other martyrs were interred here. In the middle of the 17th century they were made the burial place of the victims of the plague, and at the beginning of this century several bodies were found by Domenico Romanelli.—The catacombs of Syracuse form an immense subterranean town, with innumerable tombs cut out of the solid rock, containing the dead of all ages, nationalities, and creeds. They, also, were converted by the early Christians into places of refuge from persecution. The entrance to them is under the church of San Giovanni. The catacombs of Malta are of small extent, but in good preservation. They seem to have been used for a place of worship as well as of sepulture.—The so-called catacombs of Paris were never catacombs in the ancient sense of the word, and not devoted to sepulchral purposes until the year 1784, when the council of state issued a decree for clearing the cemetery of the Innocents, and for removing its contents, as well as those of other graveyards, into the



The Catacombs of Paris.

quarries which had existed from a remote period beneath the southern part of Paris, and by which the observatory, the Luxembourg, the Odéon, the Val de Grâce, the Panthéon, and the streets La Harpe, St. Jacques, Tournon, Vaugirard, and many others were completely undermined. Some excavations having taken place, a special commission was appointed to direct such works as might be required. Engineers and workmen were immediately employed to examine the whole of the quarries, and prop the streets, roads, churches, palaces, and buildings of all kinds which were in danger of being engulfed. The plan of converting the quarries into catacombs originated with M. Lenoir, lieutenant general of the police, and every preparation was made by sinking a shaft, propping up the cavities, and walling off various portions for receiving their future contents. The ceremony of consecrating the catacombs was performed with great solemnity on April 7, 1786, and on the same day the removal from the cemeteries began. This work was always performed at night; the bones were brought in funeral cars, covered with a pall, and followed by priests chanting the service of the dead, and when they reached the catacombs the bones were shot down the shaft. Such tombstones, monuments, &c., as were not claimed by the families of the deceased, were arranged in a field near the entrance of the shaft, and among these relics was the leaden coffin of Mme. de Pompadour. As other cemeteries were suppressed, the bones from them were removed to this general deposit by order of the government. The catacombs served also as convenient receptacles for those who perished in popular commotions or massacres. At first the bones were heaped up without any kind of order, except that those from each cemetery were kept separate; but in 1810 a regular system of arranging them was commenced, and the skulls and bones were built up along the wall. The principal entrance to the catacombs is near the *barrière d'Enfer*, but for some years past admission into them has been strictly interdicted, on account of the dangerous state of the roofs of the quarries. From the entrance a flight of 90 steps descends to the catacombs; a series of galleries are then seen branching in various directions, and several hundred yards from the steps is the vestibule, of octagonal form, and over the door is the following inscription: *Has ultra metas requiescunt beatam spem spectantes*. The vestibule opens into a long gallery lined with bones from the floor to the roof; the arm, leg, and thigh bones are in front, closely and regularly piled together, and their uniformity is relieved by three rows of skulls at equal distances. Behind these are thrown the smaller bones. This gallery conducts to several rooms resembling chapels, lined with bones variously arranged. One is called the "Tomb of the Revolution," another the "Tomb of Victims," and contain the bodies of those who perished either in

the early period of the revolution, or in the massacres of September. Calculations differ as to the number of bones collected in this vast charnel house, but it is estimated to contain at least the remains of 3,000,000 human beings. A map of the catacombs and quarries under the city has been drawn up by the order of the municipal authorities. These excavations are 3,000,000 square metres in extent.

CATAHOULA, an E. central parish of Louisiana, bounded E. and S. E. by Tensas and Black rivers, S. and S. W. by the Saline; area, 1,970 sq. m.; pop. in 1870, 8,475, of whom 4,083 were colored. Catahoula lake is in the S. part. It is watered by the Washita, Tensas, Black, and Little rivers, several of which are navigable by steamboats through the parish and on its borders. Near the Washita river the surface is partly occupied by hills. The soil in some parts is fertile, and lies upon a bed of sandstone. The chief productions in 1870 were 76,165 bushels of Indian corn, 6,528 of sweet potatoes, and 8,872 bales of cotton. There were 1,449 horses, 3,062 milch cows, 7,360 other cattle, 1,751 sheep, and 12,372 swine. Capital, Harrisonburg.

CATALANI, Angelica, an Italian singer, born at Sinigaglia about 1785, died in Paris, June 13, 1849. When only seven years old she attracted general attention by the remarkable power and purity of her voice. People went in such numbers to the convent of St. Lucia, near Rome, where she received her education, to hear her, that the police had to check the pressure of the crowd. In 1802 she made her début in opera in Rome with marked success, and afterward fulfilled engagements in the principal cities of Italy. She next appeared in Italian opera in Lisbon, Madrid, Paris, and London, where her singing created the greatest enthusiasm. In 1815 she returned from England to Paris, where for about four years she was connected with the management of the Italian opera in coöperation with her husband, M. de Valabrègue, formerly a captain in the French army. In this enterprise she was not successful. Her clear, powerful voice electrified the English, especially in "God save the King;" but her influence over continental audiences was not so great. She sang in Germany, Denmark, Sweden, Poland, and Russia, returning also occasionally to her native country, and afterward again made her appearance in Paris, but without meeting with great success. In 1830 she withdrew from the stage, and devoted herself at Florence to the education of her three children, and established a free singing school for girls. In June, 1849, during the revolution in Tuscany, she went to Paris with her daughters, but almost immediately after her arrival she fell a victim to the cholera. She had amassed a large fortune.

CATALEPSY (Gr. *κατάληψις*, seizure), a non-febrile affection, occurring in paroxysms, and characterized by a sudden deprivation of intelligence, sensation, and voluntary motion.

The disease is so seldom met with that some well known writers have doubted its existence, and have attributed the recorded cases to imposture. Bourdin (*Traité de la catalepsie*, Paris, 1841), who collected all the recorded facts within his reach, was able to unite but 38 well characterized observations. The attack is often preceded by headache, confusion of mind, loss of memory, &c.; more commonly, however, nothing of the kind has been noticed. During the paroxysm the patient retains the position and expression of countenance he had at the moment of the seizure; the face is commonly pale, sometimes slightly flushed; the pupils are dilated, but contract on exposure to a strong light; the limbs can be moved with the exertion of a little force, and retain the new position which may be given them; if the patient is standing and is pushed, he makes no effort to save himself; if placed in a painful and constrained attitude, it is retained during the paroxysm. The unvarying, motionless attitude and fixed expression give a strange and corpse-like look to the sufferer. The duration of the attack is variable; sometimes it lasts but a few minutes, sometimes 12 or 14 hours; cases are recorded in which it has been prolonged to 20 or even 30 days. Many cases occur in which the attack is less characteristically marked, or in which a portion only of the symptoms is present. Although deprived of speech and voluntary motion, the patient is more or less conscious of what is passing around him. In Duncan's "Medical Commentaries," a case is related of a woman who in this state of partial catalepsy was taken for dead, and who was perfectly conscious of what was occurring around her, while her body was being laid out and prepared for interment. In ecstasy, a disease allied to catalepsy, and which by imperceptible degrees passes into it, the patient is insensible to everything about him, while the mind is absorbed in some one object or train of ideas; the muscles are either relaxed or in a state of almost tetanic rigidity, while the patient speaks and sings, perhaps with greater readiness and ease than in his natural condition. This condition is frequently occasioned in nervous and hysterical persons by religious excitement, and is often produced in a similar class of persons by animal magnetism. It is one much more commonly assumed by impostors than true catalepsy. Both catalepsy and ecstasy seem to be closely allied to hysteria; they occur for the most part in young females of nervous habit, and both the one and the other often commence or terminate in it; occasionally, however, as is likewise the case with some of the more ordinary manifestations of hysteria, they have their origin in serious disease of the brain. The age and history of the patient will help the intelligent physician to discriminate such cases. Some strong moral excitement is generally the immediate cause of the disease, but when it is already formed, or when the predisposition to it is very strong, a most trifling cause—a sud-

den noise, the surprise of an unexpected visit, &c.—may induce a paroxysm. In itself the disease is never fatal, and morbid anatomy throws no light upon it. In regard to the treatment, in the interval between the paroxysms means should be employed to improve the general health and give tone to the nervous system. During the paroxysm the feet may be immersed in a mustard foot bath and cold applications made to the head; of these, where it can be borne, the cold douche is best.

CATALONIA (Span. *Cataluña*), a maritime division of Spain, on the Mediterranean, lying between lat. 40° 30' and 42° 51' N., and lon. 0° 15' and 3° 21' E.; area 12,504 sq. m.; pop. in 1867, 1,744,052. It is bounded N. by the Pyrenees, E. by the Mediterranean, S. by Valencia, and W. by Aragon. The coast line is about 240 m.; the principal ports are Barcelona, Rosas, and Tarragona, connected by railway with other parts of the Spanish coast and with the interior. Catalonia is divided into the provinces of Barcelona, Tarragona, Lérida, and Gerona. The face of the country is much broken by spurs of the Pyrenees. Some of these mountain ranges diverge toward the Mediterranean; others, of which the chief is the Sierra de la Llena, pursue a S. W. direction to the Ebro, and form a watershed in which 26 rivers have their rise, and flow either westward to the Ebro or eastward to the sea. The principal of these streams are the Segre, a tributary of the Ebro, the Noguera Pallaresa and Noguera Rivagorzana, tributaries of the Segre, the Llobregat, Francoli, Tordera, Ter, and Fluvia. None of these are navigable to any great extent. The general grade of the country is a descent from the mountain altitudes of the Pyrenees to the plateaus of upper Catalonia, and thence to the plains which skirt the Mediterranean. Most of the inland mountains are of granitic formation; those near the coast are limestone. Traces of volcanic origin are found especially in the vicinity of Barcelona. Valleys of remarkable fertility intersect the mountains. Such are the plateau of Urgel, and the valleys of Cerdaña, Tarragona, Valls, La Selva, Igualada, Cervera, Ampurdan, and Lérida. About half the surface is susceptible of cultivation, the rest consisting of rocks, barrens, and woodlands. Forests of beech, pine, elm, and cork are found in the mountainous districts. Iron, copper, lead, and manganese are found; coal is met with in quantity, but it has been turned to little account; crystals, amethysts, topaz, jasper, and marble occur; and there are hot and mineral springs in various parts. Of alum, nitre, and rock salt the supplies are inexhaustible; at Cardona is a mound of pure salt, 500 ft. in height and 3 m. in circumference. Near Olot, 55 m. N. of Barcelona, is a remarkable district of extinct volcanoes. Montserrat is a single and precipitous mountain, composed of a number of conical hills heaped in confusion over one another, and broken into fantastic shapes of parti-colored

limestone. The climate of Catalonia varies with the altitude of the region, but is in general temperate, the heat being moderated by sea or mountain breezes. The country is considered healthy, the interior more so than the coast. Although the orange, lemon, almond, olive, and fig grow on the plains, they are produced in less abundance than in other districts of Spain; but orchard fruits ripen in perfection. The vine is exceedingly productive, and wine is the staple export. Agriculture is further advanced in Catalonia than in any other part of Spain. This is partly owing to the industrious character of the people, partly to the nature of the soil, and in a considerable measure to the more equitable tenure of land. All kinds of grain are cultivated and consumed at home, leaving no surplus for export. The soil is usually a light loam, easily worked. Irrigation being necessary to make it productive, it is found profitable to grow wine and oil in preference to breadstuffs. Flax, hemp, dyestuffs, honey, and wax are produced in considerable quantity. Nuts and cork are important articles of export. Silk growing is but little attended to, and the raising of wool and cattle is of comparatively small extent. Since the liberation of the South American provinces, the commerce of Catalonia has greatly fallen off. The shoe trade, calico weaving, and ship building, which were formerly important branches of industry, have almost ceased to exist. Activity, however, continues in the fabrication of silks, velvets, ribbons, hosiery, linen and laces, leather, hats, cordage, brandy, cannon and small arms, glass, soap, hollow ware, and copper utensils. These are exported to France, England, and Holland, in exchange for textiles, jewelry, codfish, herring, and other articles of consumption. Along the coast a large proportion of the inhabitants are engaged in the fisheries, and there are few good harbors.—Catalonia under the Romans originally belonged to Hispania Citerior, but in the time of Augustus it formed part of the Provincia Tarraconensis. Cæsar made Tarragona the centre of his operations during his first war in Spain, and it was the chief place of residence of the generals who succeeded him. Early in the 5th century the province was occupied by the Goths and Alans, and its name is supposed by some to be derived from a combination of the names of these two nations, and to have been at first Gothalanía. In 712 it was occupied by the Moors, who held it only a few years; and in 788 it formed part of the vast empire of Charlemagne. His successors, however, maintained only a nominal sovereignty over it, the real power being in the hands of several counts among whom its territory was divided. In the early part of the 12th century the most powerful among these was Raymond Berenger, count of Barcelona, who succeeded in reducing all the others to subjection. In 1137 he married Petronilla, heiress of the throne of Aragon, and Catalonia was

united to that kingdom. It afterward rebelled several times, but toward the end of the 15th century it became an integral part of the Spanish empire, though still retaining many of its peculiar rights and privileges. Philip IV. having attempted to take these away, it revolted in 1640, and in 1641 gave itself up to Louis XIII. of France. It was restored to Spain in 1659, and again occupied by the French from 1694 to 1697. During the war of the succession it supported the archduke Charles. After the treaty of Utrecht in 1713, by which the right of Philip V. to the throne of Spain was acknowledged, Catalonia continued for a year to resist, but was subdued and deprived of its ancient rights and liberties in 1714. The French occupied it in 1808, after having been strongly resisted by the inhabitants, and again evacuated it in 1813. In 1823 it offered a staunch resistance to the restoration of absolutism under Ferdinand VII. Its rural inhabitants have always been warm supporters of the Carlist party, and it is at present (1873) the chief scene of their operations. Barcelona, on the other hand, has made itself equally conspicuous by its republican spirit.

CATALPA, a genus of plants belonging to the natural order *bignoniaceæ*, whose generic characteristics are a two-parted calyx, a bell-shaped, swelling corolla, five stamens, two of which only are fertile, a long, slender, cylindrical pod, and broadly winged seeds. There are three species, all of them trees, with simple leaves and panicle, terminal flowers. The *C. syringifolia* (Loud.) is indigenous in the southern parts of the United States, and is cultivated as an ornamental tree in most of the cities of the northern states. It is distinguished by its



Catalpa syringifolia.

silver-gray, slightly furrowed bark, its wide-spreading head, disproportioned in size to the diameter of its trunk, the fewness of its branch-

es, and the fine pale green of its very large heart-shaped leaves. Its showy flowers are white, slightly tinged with violet, and dotted with purple and violet in the throat. They are succeeded by pods, often a foot in length, which hang till the next spring. In its natural locality, this tree frequently exceeds 50 ft. in height, with a trunk from 18 to 24 in. in diameter; but in Massachusetts it dwindles to a mere shrub, and is often killed by the frost. It is cultivated in gardens in England, and on the continent of Europe. One of the oldest and largest catalpas in England is in Gray's Inn gardens, and is said to have been planted there by Lord Bacon. In parts of Italy and in the south of France the catalpa is planted as a wayside tree, and along the avenues to country villas. It may be propagated either by seeds or from cuttings of the root. It usually reaches the height of 20 ft. in 10 years, soon after which it begins to blossom. The wood is light, of a very fine texture, susceptible of a brilliant polish, and often used in cabinet-making.

CATALYSIS (Gr. *καταλύνειν*, to resolve), in chemistry, a name given by Berzelius to an obscure class of phenomena of which little is positively known. He says: "Certain bodies exert, by their contact with others, such an influence upon these bodies, that chemical action is excited; compounds are destroyed or new ones are formed, although the substance by which these actions are induced does not take the slightest part in their changes." It is now thought that this catalytic force is purely imaginary; most of the phenomena which have hitherto been referred to its agency being occasioned by several different causes, which often admit of being distinguished from each other, and which may be explained by the active operation of other known forces.

CATAMARCA. I. A province of the Argentine Republic, lying between lat. 25° and 29° S., and lon. 66° and 69° W., and bounded N. by the province of Salta, E. by Tucuman and Santiago, S. by Rioja, and W. by the Chilean Andes; area, 35,000 sq. m.; pop. in 1869, 79,551, most of whom, with the exception of 411 foreigners, are mestizos and Indians of pure blood, descendants of the once numerous and formidable tribe of the Calchaquis. Catamarca, the most picturesque of all the Andine provinces, is intersected by lofty mountain chains, the highest and most generally known of which is the Sierra de Aconquija, nearly 17,000 feet high. Watercourses are very numerous, but the only one deserving the name of river is the Santa Maria. Most of the streams become dry in summer, but in winter they swell to enormous proportions and commit great ravages. Some of the elevated plains are entirely deprived of water and all moisture, being sandy deserts; while others are periodically inundated, and when the water subsides are covered with immense crystallized cakes of salt, which are cut into blocks of about 24 inches square, and transported on llamas to

the neighboring provinces. The principal other minerals are gold and silver, rich mines of which were formerly worked, but afterward abandoned, and copper, which is extracted in large quantities. The vegetable productions comprise nearly all the grains, fruits, and vegetables of tropical and temperate climates, apples being especially plentiful. Cotton, said to be the finest in the world, is raised, though much less extensively than formerly; and there are vast forests yielding many kinds of valuable timber. The inhabitants are mainly occupied in agriculture, the manufacture of earthenware, weaving of ponchos and horse covers, and other fabrics of llama, vicuña, and sheep's wool, and also of alpaca. Large herds of these animals, and likewise of horned cattle, asses, and mules, are raised for export. Catamarca also exports raisins, tolerable wine, brandy, hides, leather, tobacco, red pepper, anise and cummin seeds, cochineal, copper in bars, &c. **II.** A city, capital of the province, situated in its centre, in a valley formed by the Ambato mountains, 725 m. N. W. of Buenos Ayres; pop. about 6,000. The streets are well laid out, and the houses, although extremely diverse in size, are strongly built and nearly all whitewashed, and surrounded by orange trees. The country immediately surrounding it is highly cultivated. The chief occupation of the inhabitants is the manufacture of woollen and silk hats. There are several flour mills and some other industrial establishments.

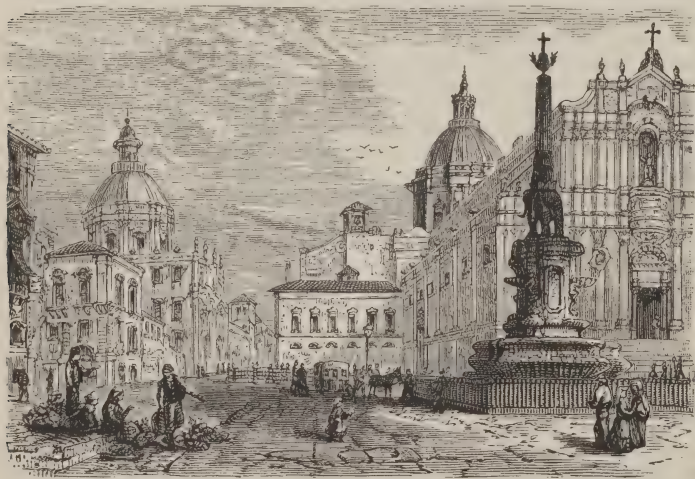
CATAMENIA (Gr. *κατά*, according to, and *μήν*, month), or **Meuses**, a monthly flowing of sanguineous fluid, which occurs in the female economy. The function of menstruation generally commences at the age of puberty, and terminates at the "critical period," or "change of life," including a period of some 30 years, between the ages of 14 and 45. The blood of the catamenial flux is exuded from the vessels of the uterus, and escapes through the vagina; the flow generally returns every 28 days, and continues from 3 to 6 days. The amount discharged varies from 4 to 8 oz. in most cases. The first menstrual flow is generally preceded by languor, pains in the back, headache, chilliness, &c., which usually disappear when the discharge takes place. The after occurrences are often unaccompanied in healthy females by any premonitory or attendant symptoms. During the whole of a woman's menstrual life she is capable of bearing children. After it is closed, she ceases child-bearing.—The influence of climate in advancing or retarding the period of puberty and menstruation has been shown by recent observation to have been formerly much overrated, the average period being much the same all over the world, and exceptional cases about as numerous in one region as in another. Mr. Robertson has shown, from statistical evidence, that menstruation does not occur more early in the negress than in the white female, and Dr. Vaigas affirms that precocious menstruation is more common in the

white than in the colored races. Early marriages in Hindostan and other warm climates, then, do not depend on natural precocity, but on the habits and customs of the country.—The uterus is congested during the menstruation, and so are the ovaries and the Fallopian tubes; the tissues of the vagina are relaxed, and the *os uteri* is softened and swollen; these conditions disappear when the flow ceases, and the parts return to their natural state. During pregnancy and lactation the menses usually cease, and they may also be suppressed from other local causes.—Vicarious menstruation sometimes takes place as a means of obviating the ill effects of suppressed menstruation, by substituting a similar discharge from some other part. It occurs from the gums, the nostrils, the lungs, the stomach, or even from the eyes, and other parts of the body.

CATAMOUNT. See COUGUAR.

CATANIA. I. A province of Sicily, on the E. coast, bounded N. by Messina, E. by the Ionian sea, S. by Syracuse, and W. by Caltanissetta and

years the Albanian language and the Greek rite in divine worship. II. A city (anc. *Catana* or *Catina*), capital of the province, situated on the E. coast, on the shore of the gulf of Catania, which is an inlet of the Mediterranean, at the foot of Mt. Etna, 30 m. N. W. of Syracuse; pop. in 1872, 84,397. It is the handsomest city in Sicily, with wide and regular streets, and numerous and splendid public buildings. Its vicinity to Etna has introduced the use of lava for various purposes. The streets are paved with it, the finest buildings are made of it, and it is formed also into ornamental chimneypieces, tables, and toys. It has many remains of the ancient Roman city, among which are an amphitheatre, a theatre, and ruins of baths and temples. Its principal public edifices are the cathedral, rebuilt since the earthquake of 1693, the senate house, the university, and a vast Benedictine convent. Since 1867 it has been the seat of an archbishop, formerly of a bishop. It is one of the three principal ports of Sicily, and is the



Square of the Elephant.

Palermo; area, 1,970 sq. m.; pop. in 1872, 479,850. It comprises the four districts of Catania, Acireale, Caltagirone, and Nicosia. With the exception of the Piana di Catania (plain of Catania), the province is mountainous, and includes in its limits Mt. Etna. The chief rivers are the Giarretta and its affluents. The Piana is very fertile, but only imperfectly cultivated. Near Militello and Scordia there are, however, flourishing plantations of olives and oranges. The slopes of Mt. Etna are covered with rich pastures. The chief articles of export are sulphur, grain (chiefly wheat), wine, oranges, lemons, nuts, oil, kid skins, linseed, sumach, soda, lava, and snow from Etna, which is sent to the ports of Sicily, to southern Italy, and Malta. Manufactures of silk and cotton are leading industries. A colony of Albanians in this province has preserved for more than 400

leading mart for silk; besides the silks retained for the local manufactures, considerable quantities are exported. Cotton manufactures, which were formerly limited to coarse cloths for home consumption, have recently received a great development. Cotton is also exported to France and England. There are also manufactures of linen, and carvings of amber, lava, marble, and wood.—The city is supposed to have been founded in the latter part of the 8th century B. C. by Greek colonists from the neighboring town of Naxos. It suffered

severely during the Syracusan and Roman wars, and in the first Punic war sided with the Carthaginians, but was among the first of the Sicilian cities to submit to the Romans after its close. It has been several times destroyed by earthquakes and eruptions of Etna; as in 121 B. C., A. D. 1169, 1669, and 1693; but it has each time been rebuilt with greater beauty than before. In 1848 and 1849 there were violent popular outbreaks; and on April 6, 1849, the Neapolitans expelled the Sicilians from the city.

CATANZARO. I. Or *Calabria Ulteriore* II., a province of S. Italy, in the former kingdom of Naples, bounded N. by Cosenza, E. by the Ionian sea, S. by Reggio, and W. by the Tyrrhenian sea; area, 2,307 sq. m.; pop. in 1872, 412,226. It comprises the four districts of Nicastro, Cotrona, Catanzaro, and Monteleone. One half of the province is level, the other

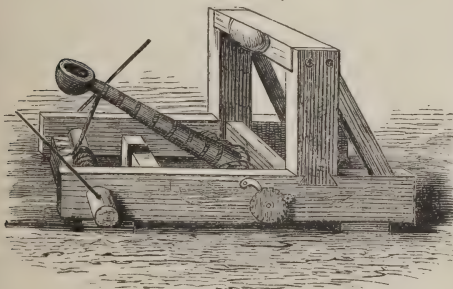
half partly hilly and partly mountainous. Only a small portion is watered by small rivers. The chief products are vegetables, chestnuts, acorns, milk, cheese, butter, silk, wool, hemp, lumber, oil, and wine. It has several coal mines and marble quarries. **II.** The capital of the province, situated on a mountain near the gulf of Squillace, 30 m. S. S. E. of Cosenza; pop. in 1872, 24,901. It is the seat of a bishop, and has a cathedral, several churches and convents, a castle, a royal academy of sciences, and numerous schools and charitable institutions. Considerable trade is carried on in cattle, corn, and wine, and there are manufactures of silk velvet, embroidery, and carpets. It suffered severely from the earthquake of 1783, which overthrew some of the principal buildings.

CATAPLASM (Gr. *καταπλάσσειν*, to spread over, to plaster), a poultice or soft substance applied externally to some part of the body, either to repress inflammation and allay pain, or to promote inflammation or its consequences, and lessen the pain attending it. For the former purpose it is applied cold, and often contains a preparation of lead to increase its astringent and refrigerating power; for the latter it is used at different degrees of temperature. When intended to hasten the progress of inflammation and lead to suppuration, poultices should be of as high a temperature as the part will bear, but of a lower temperature when used as mere emollients. Cotton wool, steeped in water, and bound to the part with a light bandage, is a very simple and efficient application, in most cases where a cold poultice is required to allay pain and repress inflammation. Warm poultices may be made of bread, slippery elm bark, or flaxseed meal.

CATAPULT (Gr. *κατά*, against, and *πάλλειν*, to hurl), an ancient military engine for throwing stones, darts, and other missiles, invented in Syracuse in the reign of Dionysius the Elder. It acted upon the principle of the bow, and consisted of wood framework, a part of which was elastic, and furnished with tense cords of

distance of 400 paces, and Josephus gives instances of their throwing great stones to the distance of a quarter of a mile. The Romans employed 300 of them at the siege of Jerusalem. From the time of Julius Cæsar it is not distinguished by Latin authors from the *ballista*, which was originally used only for throwing masses of stone.

CATARACT, a disease of the eye in which there is an opacity of the crystalline lens or of its capsular investment. It is most common in old persons, in whom it seems to be the natural consequence of age; but it also occurs in infants, and is even congenital; it appears to be more frequent in cold and damp climates than in warmer regions, and it is certainly hereditary in many instances. Among the exciting causes, especially of the capsular form, are wounds and inflammations of the internal eye; but the ordinary cause is the diminished nutrition of the organ in common with others in advancing age. True cataract may be either lenticular, capsular, or capsulo-lenticular, according as the seat of the opacity is in the lens itself, in its capsule, or in both at the same time. Certain cases of opacity external to the crystalline apparatus have been called false cataracts, and may be caused by the effusion of lymph, blood, or pus, or by false membranes; secondary cataracts are those which follow the surgical operations for the extraction or depression of the lens. The lenticular cataract may vary in hardness from stony to gelatinous; its opacity is rarely uniform, being generally thickest in the centre and thinnest on the edges; in some cases the opacity begins at the circumference in rays which slowly converge to the centre; the color varies from pearly white to amber yellow. The capsular cataract, which Velpeau considers more common than the lenticular, offers a great variety of colors and streaks, and may occupy either the anterior or posterior surface, or both. In the last form of cataract both the lens and its capsules are involved, with the varieties common to both. The physical sign of cataract is a more or less troubled appearance behind the pupil, of a yellowish color, deepest in the centre, and becoming more distinct as the disease progresses; the rational sign is a gradual diminution of vision, accompanied by the sensation as if a cloud, specks, spiders' webs, or snowflakes were passing before the eyes; objects are seen best in certain positions of the head, as when turned on one side, and during the evening or in the shade when the dilated iris permits more light to enter the pupil; on looking at a candle the flame appears surrounded by a thick bright haze. The progress of the disease is very slow, generally unaccompanied by fever, pain, or any disturbance of the general health. It is very rare for a person to be unable to distinguish day from night. M. Sanson has proposed an excellent catoptric test for the detection of cataract by the reflection of light. When a lighted candle is held before the eye of a



Catapult.

hair or gut. Catapults were of various sizes, being designed either for field service or bombardments. The largest of them projected beams 6 ft. long and weighing 60 lbs. to the

healthy person, three images of it may be seen: the first erect, moving upward when the candle is moved upward, produced by reflection from the cornea; the second also erect, produced by reflection from the anterior surface of the crystalline capsule, and moving upward with the candle; the third very small and inverted, reflected from the posterior surface of the capsule, moving downward when the light is carried upward. In cataract, the inverted image is from the beginning indistinct, and soon disappears entirely; the deep, erect one is also soon rendered invisible. By dilating the pupil with belladonna, this experiment is rendered easy and striking. Cataract is for the most part remediable only by a surgical operation; certain forms, caused by inflammation of the capsule, may disappear with the exciting cause without an operation; and cases are on record of the spontaneous cure of lenticular cataract by the rupture of the capsule and the escape of the lens into the anterior chamber of the eye, where it is gradually dissolved.—From the earliest antiquity surgeons have attempted to destroy cataract by means of needles and knives of various forms. Whenever the disease is confined to the lens and its capsule, and the eye in other respects is healthy, and the patient not too young or too old, an operation may be attempted with a prospect of success; in infants, and in persons under 20 years of age, both eyes may be operated on at once; after the age of 80, the chance of a successful issue is generally small. Before submitting persons to this operation, it is well to prepare them a day before by a mild diet and a gentle laxative, and to allay any inflammatory tendency of the organ; and then to smear belladonna ointment around the orbit, or to put a few drops of its fluid extract into the eye, for the purpose of dilating the pupil to its utmost extent.—All operations for cataract reduce themselves to three, which have for their object either to displace the lens, to break it up, or to remove it from the eye. 1. Operation for depression of the lens, or couching. The description of this may be found even as far back as Celsus; it has undergone many modifications in modern times. The instrument employed is a fine needle, either slightly curved at the end or straight with the point spear-shaped; Scarpa's needle is slightly curved at the end. When the needle is passed through the sclerotic, as ordinarily, the operation is called *scleroticonyxis*; when it is passed through the cornea, *keratonyxis*. Different needles are preferred by different operators; but, as in the case of the stethoscope, that instrument is the best to which the surgeon is accustomed. In *scleroticonyxis* the needle, held like a pen, is passed through the sclerotic perpendicularly to its surface, a line or two from the cornea and a little below its transverse diameter; the concavity of the instrument is turned down, in order to separate rather than to divide the fibres of the membrane; when the

needle is fairly in, its concavity is turned backward, so that it may pass under and before the lens without touching the iris or the capsule; when it has reached as far as the pupil, the capsule is lacerated by delicate circular movements of the point; then the needle is applied directly to the lens, which is pushed outward and backward to the bottom of the globe, out of the line of the axis of vision; it is held there a short time, that the cells of the vitreous humor, into which it is pushed, may resume their position around it, and thus prevent its reascension in the line of the pupil. Some surgeons prefer the operation by reclination, which consists in turning the lens backward from an upright to a horizontal position; and some always recline the lens before they depress it. In *keratonyxis*, the needle is passed through the cornea, about an eighth of an inch from the sclerotic, on its lower and exterior portion, and is directed through the dilated pupil to the lens, whose capsule it is made to lacerate; and, if possible, the lens is depressed, reclined, or broken up. This method is objectionable on account of the danger of wounding the iris, and of the difficulty of reaching the lens, and is applicable only to exceptional cases. After the operation, the eye should be lightly covered, and the patient should remain in bed in a darkened room, with the head raised, and be kept on a low diet for a few days; after four or five days in ordinary cases, a little light may be gradually let into the room, and at the end of three weeks the eye may be generally left uncovered. The accidents most to be feared are inflammation of the iris, choroid coat, and retina, which should be treated by antiphlogistic measures. 2. The operation for breaking up the lens, without depressing it, is very easily performed, and excites very little inflammation; but it requires frequent repetition, is slow in its progress, and is adapted only to soft and especially to congenital cataracts. The needle is inserted just as in the method for depression, the capsule is divided, and the lens is freely broken up without removing it from its place; the cataract is thus brought into contact with the aqueous humor, and is gradually dissolved by it. 3. In the operation for extraction, the cornea is incised through rather more than half its circumference, the capsule is lacerated, and the lens is extracted from the eye entire; it is performed with a triangular knife, with sharp point, straight and blunt back, the edge slanting obliquely, and the blade growing wider and thicker as it approaches the handle; this kind of knife cuts by the simple motion of pushing, and fills up the incision as it makes it, thereby preventing the escape of the aqueous humor. The cornea may be cut on its inferior or superior half, or obliquely on its external and lower portion, each of which has its special advocates. When the lower half is cut, the knife, with its edge downward and forward, is passed into the external side of the cornea, perpendicular to its axis, a little above its transverse diameter, and about a line from the sele-

rotic; passing in front of the iris, the point is made to cut its way out on the inner opposite surface; the cutting of this flap constitutes the first period of the operation, after which the lids are permitted to be closed for a few seconds. Taking care in the subsequent steps of the operation not to make pressure upon the globe, the surgeon raises the flap, and, by means of a proper needle, lacerates extensively the capsule; if at this time the lens does not of itself come forward into the anterior chamber, gentle and properly directed pressure will cause it to come out; to complete the operation, it is sometimes necessary to remove also the pieces of the divided capsule. When the lower half of the cornea is opaque or in a condition unfavorable to cicatrization, or very small, Wenzel, Richter, and Jäger recommend the section of the upper half; the steps of the operation are about the same, though perhaps more difficult to execute; it offers the advantages of presenting less liability of the iris being wounded, of the vitreous humor escaping, and of the lips of the section being separated by the edges of the lids. By the oblique incision, which is the favorite mode in France, the lids could not possibly interfere with the apposition of the edges of the wound. More care is required after extraction than after depression, to avoid inflammation; after it is certain that the patient can distinguish objects, the eye is lightly covered and the person confined to bed in a dark room, with the head but slightly elevated.—Of these operations, extraction removes with certainty the obstructing lens, is very little painful, does not wound the ciliary vessels or nerves, the choroid, or the retina; but it may cause deformity of the pupil or the escape of the vitreous humor; the edges of the wound may not readily heal, or may ulcerate, with hernia of the iris or opacity of the cornea. Depression leaves a permanent cause of irritation in the eye, and the lens is liable to reascend; the needle perforates the choroid and retina, and may cause inflammation of the internal eye; but there is no danger of the escape of the vitreous humor, nor of spots or ulcers of the cornea, nor of hernia of the iris, nor of immediate evacuation of the globe. Depression is best in children and intractable persons, where the eyes are small and deep-seated, the cornea flat, or the conjunctiva irritated. When the cataract is soft and the pupil small or adherent, extraction is best in old persons, in adults with a large anterior chamber and the eyes sound, and when the cataract is hard or membranous. Convex spectacles are necessary, under proper restrictions, to supply the place of the extracted crystalline lens.

CATARRH, a non-inflammatory disease, characterized by an increased secretion of mucus from the glands of the mucous membranes. The name is popularly confined to disease of the membrane of the air passages, but it should be extended to that of the intestinal, urinary, and even genital mucous membranes. Children and

adults of the lymphatic temperament are most subject to catarrh; and it occurs most frequently in cold and damp seasons, accompanied by sudden changes of temperature, and in individuals weakened by insufficient food, foul air, and mental anxiety; it also occurs epidemically. Catarrh of the air passages is rarely accompanied by any constitutional disturbance; the principal symptoms are sneezing, increased secretion of tears and mucus, and a snuffling nasal respiration. In many cases of catarrh of the bladder, the urine is loaded with mucus, and the state of its membrane highly irritable, without being positively inflamed. Catarrhal diseases often occur epidemically, under the name of catarrhal fevers, in which there seems to be a morbid disposition in all the mucous membranes to secrete an excess of mucus. Besides the conditions already mentioned, the genital mucous membrane may be affected, constituting some form of leucorrhœa and blennorrhœa; the conjunctiva may also be attacked, giving rise to catarrhal ophthalmia; some of these conditions, especially the last two, may become contagious, without the usual specific origin.—These catarrhal diseases are not generally dangerous; but they are apt to become chronic and exceedingly difficult to remedy, when the lungs, stomach, intestines, and genito-urinary organs are affected, and especially when occurring, as they often do, in old and debilitated persons. The treatment of the mild forms is entirely expectant; in the chronic stages, the principal dependence is on tonics and stimulants, especially quinine, and on local applications of a stimulating and alterative character whenever the seat of the disease is directly accessible. They form some of the most obstinate cases which the physician has to manage, both from the difficulty of direct medication, and from the age and weakness of the majority of persons who suffer from them.

CATASAUQUA, a borough of Lehigh co., Penn., on the left bank of the Lehigh river, 3 m. above Allentown; pop. in 1870, 2,853. It contains 7 churches, a bank, 4 hotels, a semi-monthly periodical, 2 machine shops, 2 rolling mills, gas works, and 5 blast furnaces, one of which produces 250 tons of iron a week. The Lehigh Valley and the Lehigh and Susquehanna railroads are joined here by the Catasauqua and Fogelsville railroad.

CATAWBA, a W. central county of North Carolina; area, 250 sq. m.; pop. in 1870, 10,984, of whom 1,703 were colored. It derives its name from the Great Catawba river, which forms its N. and E. boundary, and is drained by the South Catawba. The surface is diversified, and the soil fertile. Iron ore is abundant. It is crossed by the Western North Carolina railroad. The chief productions in 1870 were 34,746 bushels of wheat, 142,876 of Indian corn, 41,553 of oats, and 22 bales of cotton. There were 1,252 horses, 1,458 milch cows, 2,135 other cattle, 4,644 sheep, and 6,768 swine. Capital, Newton.

CATAWBA, or **Great Catawba**, a river of North and South Carolina. It rises in the Blue Ridge, in McDowell co., N. C., flows nearly E. through the gold region of North Carolina, makes a bend to the south at the W. border of Iredell co., and enters South Carolina near the mouth of the Little Catawba, or Catawba creek, in York co. After reaching Rocky Mount, and being joined by Fishing creek, it takes the name of the Wateree, and ultimately unites with the Congaree to form the Santee. The length of the Catawba is about 250 m.; that of the Wateree, 100 m.

CATAWBAS, a tribe of Indians in North and South Carolina, on the Catawba river, now reduced to a mere handful. At the time of the settlement of those states they were a powerful tribe with 1,500 warriors. Some affirm that they came from Canada, but their language has no affinity with that of any northern nation, is closely connected with that of the Waccos and the Carolina tribe, and has affinities with the Muskogee and even the Choctaw. They are said to have been called also Usherees. They occupied Nauvasa and five other towns on the Catawba river, in a most delightful country. They were a warlike people, and were early engaged in hostilities with the Cherokees, and subsequently with the Shawnees and Iroquois. They were always friendly to the Carolina settlers, and served with them against the Tuscaroras and Cherokees, and in the revolution. Having improvidently leased their lands, they migrated to the Cherokees, but returned and settled on a reservation given to them. War and disease gradually reduced their numbers. From 7,500 at the time of the settlement, they had decreased to 2,000 in 1728, and 450 in 1822. Peter Harris, the last full-blooded Catawba, was a revolutionary soldier. There are now perhaps 200 half-breeds bearing the name on the reservation. Pontiac, who attempted to destroy the English power in the northwest, is said by some to have been by birth a Catawba. This tribe was one of those which flattened the heads of infants.

CATAWBA WINE. See **AMERICAN WINES**.

CATBIRD (*mimus Carolinensis*, Gray), a bird of the thrush family, peculiar to North America. It receives this name from its well known note, which resembles the mew of a half-grown cat; this is not, however, its only note; its morning and evening song of wild warbling melody is worthy of the musical family to which it belongs. The catbird is found from Maine to Florida, making its appearance from the south toward the last of February, reaching the middle states about the second week in April, and New England about May 1; it is one of the few species which follow the course of agriculture, being rarely found far from the habitations of the farmer. Its general form is more slender and graceful than that of the American robin. Its plumage is soft and blended, the tail long and rounded at the tip; the bill is black, slightly arched; the general color

of the upper plumage is blackish gray or slate color, the head, tail, and inner webs of the quills being of a brownish black; the cheeks and general under plumage are of a deep bluish gray, paler on the abdomen, the under tail coverts being brownish red; the outer tail feather is transversely striped with white on its inner web; the plumage of the female is of a somewhat paler tint. Length 9 inches, extent of wings 12 inches, length of tarsus $1\frac{1}{2}$ inch. The nest is large, generally made in bramble thickets, and constructed of twigs and briars mixed with leaves, weeds, and grass, lined with dark fibrous roots arranged in a circular manner. The eggs are from four to six in number, of a greenish blue color, without spots. Its food consists of insects and fruits and berries of all kinds, especially of the sweetgum, poke, and sumach. It migrates during the night. It is very lively in its manners, and will follow with impudence for a considerable distance any intruder on its locality, mewing as it sits on a twig, jerking its tail from side to side. It is very irritable, and hates especially cats and snakes. Its attachment to its young is very remarkable,



Catbird (*Mimus Carolinensis*).

and it will often feed and raise the young of other species. Besides its own song, it possesses considerable imitative power, mocking the notes of other birds in an imperfect manner; according to Latham, it will, when in a domesticated state, imitate strains of instrumental music. Though this bird is generally persecuted, it deserves the kindest treatment for its services to the agriculturist in devouring wasps, grubs, worms, and insects, which would have destroyed tenfold more growing fruit than it ventures to claim at the season of maturity. Its flesh is good, but is rarely used for food.

CATEAU, Le, or **Cateau Cambrésis**, a town of France, in the department of Le Nord, on the river Selle, 17 m. S. of Valenciennes; pop. in 1866, 9,974. It is well built, has salt works, manufactories of merinoes, shawls, calicoes, soap, and tobacco, and is noted for producing a superior quality of linen thread. Two treaties were signed here on April 2, 1559, between England and the Netherlands on the one side, and France and Scotland on the other, and on the following day between France and Spain.

CATECHISM (Gr. *κατηχισμός*, instruction), in a general and modern sense, an elementary text book of any science or art. More commonly, however, it means a text book for the instruction of the catechumens and children of a parish or congregation in the doctrines of the church, or the moral precepts of Christianity. The original form of this instruction was oral, by question and answer. The practice was to gather those who needed instruction into some suitable place, and there persons qualified either held disputations or delivered dogmatic lectures, and then questioned the hearers upon what had been said. It is probable that the early catechists followed no set forms, but endeavored, by catechising their hearers, to awaken a train of thought, and then followed it whithersoever it might lead. But when the doctrinal theology of the church became more strictly defined, catechetical instruction became more dogmatic. These compends have of course varied with the variations of theological opinion in different ages and communions. A formula of doctrine, the *Catechismus Romanus*, was drawn up by order of the council of Trent, and published at Rome in 1566, under the sanction of Pope Pius V., and was subsequently approved by special bulls and adopted by vote of provincial synods in various Catholic countries. It was ordered that it should be faithfully translated into the vernacular languages, and expounded to the people by all pastors. But it was designed as a directory for the use of the clergy rather than as a system of popular instruction. It was not originally in the form of question and answer, though some later editions are in that shape. In common use in various parts of the Catholic world were the catechisms drawn up by Canisius (1554 and 1566), by Bellarmine (1603), and by Bossuet (1687). A catechism designated as *Schema de Parvo*, essentially that of Bellarmine, was decreed by the œcumenical council at Rome in 1870, its object being to provide a common catechism for the whole church. Strictly speaking, the Greek church has no authorized catechism; but that of Mogilas, metropolitan of Kiev (1642), was in 1672 recognized as a standard by a synod at Jerusalem. The principal Protestant catechisms are those of Luther (1529) and Calvin (1536); the Heidelberg catechism (1562), on the basis of which the Zürich catechism was drawn up (1639) for the Reformed church of Germany; that of the Socinians, published at Raków (1574 and 1608); that of the English church, the work probably of Cranmer (1549), with the exception of that part which relates to the sacraments, which was added by Bishop Overall in the first year of James I., after the conference of Hampton court; and that of the Westminster assembly, longer and shorter (1643), which serves as a basis for the Calvinistic and Presbyterian churches both of Great Britain and the United States. There are many mediæval writings and documents bearing the name of catechisms, which if collected together would

form a work similar to the collections already made of old liturgies and hymns. The private or individual catechisms of German theologians are numerous, and many of them voluminous, thus departing from the primitive idea of the Christian catechism as an instrument for popular and elemental instruction.

CATECHU, an extract of the inner wood of the *acacia catechu*, a small tree which grows abundantly in the East Indies. The drug had long been in use before its origin was discovered. It is prepared by cutting off the exterior wood, and boiling the dark-colored chips of the interior of the trunk in water. The solution is then evaporated to the consistence of sirup, when it is dried in the sun in the form of flat cakes, or moulded by pouring it into earthen vessels. There are many varieties, some of which probably never reach this country. That common in our markets is the preparation above described, and is imported from Calcutta.



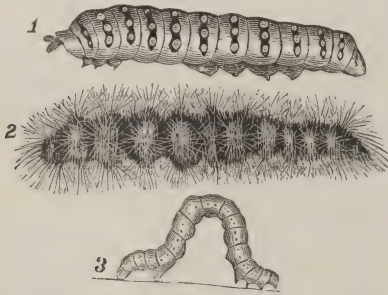
Acacia catechu.

The pale catechu of the British pharmacopœia, or gambir, is probably the substance formerly called *terra japonica*, and is the product of another tree, the *uncaria gambir*, of the family *rubiaceæ*. Catechu contains from 33 to 55 per cent. of that variety of tannic acid which precipitates the persalts of iron of a greenish black. Catechuic acid, in some respects resembling gallic acid, is found both in the dark and pale catechu. Catechu is used in dyeing and tanning under the name of cutch. It is used in medicine, in substance and tincture, as an astringent. It is said to be slightly tonic.

CATEL, Franz, a German artist, born in Berlin, Feb. 22, 1778, died in Rome, Dec. 19, 1856. His early works were designs for illustrated almanacs, and he first acquired reputation by his illustrations of Goethe's *Hermann und Dorothea*. He went to Paris in 1807, where he was led to abandon water colors and begin painting in oil. At this time, however, he designed

a series of beautiful vignettes for Caro's Italian version of the *Æneid*. Going to Rome in 1809, he painted historical, genre, and landscape subjects successively, and greatly modified the style which he had acquired at Paris. In 1834 he painted a "Resurrection of Christ" for the Luisenkirche at Charlottenburg near Berlin, a large work containing many figures. With this exception, his most celebrated paintings are landscapes. Of these, his views of Naples, Vesuvius, Sorrento, Salerno, and in Sicily, to which island he went in 1818, are considered the best. His works found their way over all Europe, and as they commanded high prices he became rich. In 1841 he was made a member and professor of the academy of Berlin. He left his fortune to be invested for the benefit of poor artists.

CATERPILLAR, the common name of the larvæ of lepidopterous insects, including butterflies and moths. Caterpillars vary greatly in form and appearance, as may be judged from the fact that about 600 species are known in



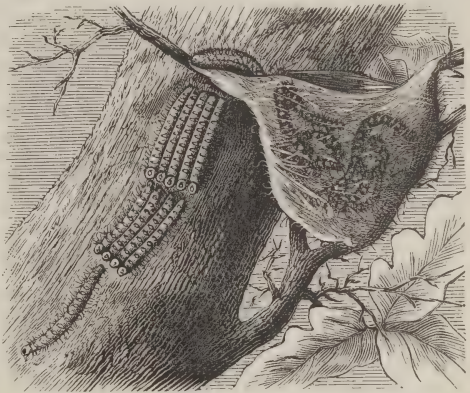
1. Smooth Caterpillar (*Asterias*). 2. Hairy Caterpillar (*Acraea*). 3. Spanner (*Geometra*).

New England alone, and probably many are yet unknown. The body is composed of 13 segments; the first constitutes the head, containing the jaws and oral appendages; the second, third, and fourth form the thorax of the future insect, and the remaining ones make up the abdomen. The head is rounded, and of a harder consistence than the body; on each side are six very small *ocelli*, or simple eyes, with a very convex cornea and a spherical crystalline lens, two short antennæ, and a mouth, with strong jaws moving transversely; the mandibles are hard, for breaking up the food, while the maxillæ are soft and adapted rather for holding it; in the middle of the lower lip is a conical tube, through which issue the silken threads from which their nests and cocoons are made, and their suspensory fibres; a viscid fluid, enclosed in two long and slender bags, is poured out through the "spinneret" in a fine stream, and hardens into silk on contact with the air. The segments of the body are very nearly equally developed; the second, third, and fourth have each a pair of tapering, jointed legs, covered with a shelly skin and ending with a little claw; these are the rudiments or cases of the future limbs, and are

the true organs of locomotion; some of the other segments are furnished with soft, jointless, fleshy, and contractile legs, called prop legs, which disappear with the larval condition, being only prolongations of the external covering and shed with it, like the nails and claws of the higher animals; the abdominal legs vary in number from four to ten, and are provided around the margin of the sole with rows of minute hooks capable of such direction as is necessary for a secure hold. The body is in some cases smooth, in others hairy, and even spiny; these external appendages, whether for ornament or defence, are shed with the skin before the pupa state. Where the middle portion of the body is unprovided with feet, the caterpillar adopts the arched or looped manner of walking, so familiarly known in the common canker worm; these species are hence called spanners, loopers, surveyors, and geometers; some, when in a state of repose, fix themselves by the hind legs only, and project in a rigid condition from branches, which they then much resemble in direction, form, and color; the power of remaining thus immovable for hours at a time must be due to a muscular force of which we have no idea in vertebrated animals; the species which have eight to ten intermediate feet walk by short steps, in a continuous worm-like manner. Some smooth caterpillars, as those of the sphinx moth (commonly called potato worm), have a spine or thorn upon the top of the last segment of the body, directed backward and curved; though this looks like and has been considered an offensive or defensive weapon, its softness is such that it could inflict no wound. The larvæ of some of the hymenopterous insects, as of the saw flies (*tenthredinidæ*), resemble caterpillars both in form and habits; but these false caterpillars may be distinguished by their greater number of legs (18 to 22), and by the absence of the numerous hooks in their prop legs; the larvæ of other insects, having the same number of segments, are scaly and not soft and membranous. On each side of the body are nine oval apertures, spiracles, or *stigmata*, situated in the second, fifth, and following segments to the twelfth, provided with valves; these communicate directly with the internal respiratory organs, which are in the caterpillar branching tubes; in the perfect insect, the tracheæ are dilated into an immense number of vesicles permeating every part of the body. The intestine is short and straight. The nervous system is a series of ganglia connected by chords, one for each segment, the greater part of it in the perfect insect being concentrated in the head and thorax. Caterpillars vary greatly in size; the mean may be taken at an inch, those much exceeding this being large, while those much below it may be considered small; those which have only eight feet in all are the smallest, and are generally the moths' caterpillars. The size of a caterpillar compared to that of the egg is very great, and the rapidity of its

growth is truly astonishing; there is no large animal at all comparable to it for voracity, for some species will eat in 24 hours more than double their own weight; though less voracious than locusts, they are quite as destructive from their greater fecundity and their wider distribution over the vegetable world. According to Count Dandolo, the common silkworm, during the 30 days in which it attains its full size, increases in length from 1 to 40 lines and in weight from $\frac{1}{100}$ to about 95 grains; during this period, therefore, it has increased 9,500 times in weight, and has eaten 50,000 times its weight of food. The caterpillar of the privet hawk moth on leaving the egg weighs about $\frac{1}{80}$ of a grain, and at the end of 32 days, when it has acquired its maximum size, it has been known to weigh 142 grains, and to measure over 4 inches in length, thus increasing more than 11,300 times its original weight. According to Lyonnet, the larva of one of the carpenter moths (*cosmus ligniperda*, Fabr., or genus *zyleutes* of Newman), during the three years in which it is supposed to remain in the caterpillar state, increases 72,000 times its first weight by a great accumulation of fat for its nutriment in the pupa and perfect states. Most caterpillars feed on vegetable substances, the leaves, flowers, roots, buds, seeds, and even the wood of plants; many domestic pests gnaw woollens and furs, leather, and fatty substances; while some are quite exclusive in their diet, others are more indiscriminate feeders. When they are very numerous, scarcely any plant escapes their attacks, and at such times their ravages are deplorable, reducing trees in mid-summer to their winter leafless livery. Plants with acrid juices are the favorite food of some species, and the nettle and other spiny shrubs are the natural habitats of many smooth and tender-skinned varieties. Most feed on the exterior of plants, but some of the most destructive and most delicate live in the interior of branches and stems. The sweetest fruits, as pears, plums, and apples, ripen and fall prematurely, the abodes of caterpillars; plums are especially liable to be thus inhabited, while the peach and apricot are free from all larvæ; it has been observed that a single fruit rarely contains more than a single caterpillar, the second inhabitant, if there be one, being the larva of some other order of insects. Wheat, rye, barley, and other grains are infested by small caterpillars, which gnaw away the whole interior without any external perceptible trace, so that an apparently sound heap may be only a collection of useless skins; a single grain contains just the quantity of provision necessary for the transformation of the insect. Another example of the instinct of the lepidoptera is seen in the fact of their depositing their eggs on the parts of the plant which will furnish an easily accessible supply of food to the caterpillar when it is hatched; their eggs are found glued to fruits, and to flowers that are to produce fruits, between the very petals, so that the young find themselves sur-

rounded by an immediate supply. Caterpillars are remarkable for the eagerness with which some species will feed upon their fellows, in preference to vegetable substances in profusion around them. Different species select different times of day for feeding; some eat at all hours, some in the morning and evening, and others only at night; a knowledge of these habits is of great advantage for the easy destruction of many pests of the vegetable garden. Though generally disgusting objects, the contrast and brilliancy of the colors in some of them are eminently beautiful. Some species herd together in great numbers, constructing their silken habitations in common; others live solitary, exposed to light and air, or protected in rolled leaves or silken sheaths; others burrow in the ground, or conceal themselves in the stems of plants and the pulpy substance of leaves. The caterpillars which live in one nest all come from the eggs of a single insect, and are generally hatched on the same day; from 200 to 700 may thus be found together, and may remain so through the chrysalis condition, or may sep-



Processionary Caterpillars.

arate at different periods of life; some, though living in great numbers on the same tree, are solitary with respect to each other, performing no work in common; the most solitary are the leaf-rollers, which are also the most remarkable for their vivacity. For the mechanism of the various abodes of caterpillars the reader is referred to the works of Réaumur, Latreille, Kirby and Spence, and other practical entomologists. The attitudes assumed by caterpillars when attempts are made to catch them are characteristic of species in many cases; some roll themselves into a ring and remain as if dead, the hairy ones resembling little hedgehogs; others fall instantly to the ground and try to escape by rapid flight; some attempt to defend themselves by various motions of their bodies. The mode of marching adopted by the "processionary caterpillars" is very remarkable; these live in society, and when they quit their nest they go in a regular procession, a single caterpillar first and the others in

single file, or two, three, and four abreast; the line is so perfect in the columns, that the head of one is never beyond that of another in the row; following their leader, stopping when he stops, they make journeys from tree to tree in search of food, returning to their nest in the same order; they form their ranks, march, and halt, with the precision of soldiers; when several nests are in the same wood, the spectacle of these creeping battalions, issuing forth and returning at the same hour, is exceedingly interesting; the processions generally take place toward night. Another species, common in pine forests and living together, walk in procession in single file, often very long, the head of each in contact with the tail of the one in advance; they defile in a straight line, or in a variety of graceful curves; they sometimes go to great distances from the nest, always with the same slow and grave step, following exactly their leader; they return to the nest by the same path, which they find not by the sense of sight but of touch; the path of exit is covered as they go by a silken tapestry, and they return upon the same delicate carpet, however tortuous may have been their way. Caterpillars change their skins several times before attaining their perfect state, spinning for themselves a sort of cocoon of silk, interwoven with hairs of their own, with bits of leaves, and even with particles of earth, suspending themselves by silken threads, or burying themselves in the ground. (See BUTTERFLY, vol. iii., p. 495.) Those lepidoptera which pass the winter in the egg live in the caterpillar form during a part of the summer; the eggs are protected against cold by the shell and by the sheltered or subterranean situations in which they are placed; others pass the winter as caterpillars, concealing themselves under stones and the bark of trees, or descending deep into the ground where the cold cannot reach them; the social varieties retire to their warm and water-proof nests; these come forth in the spring quite well grown, but most pass the winter in the form of chrysalis, in protected or in open situations; a few pass this season as perfect insects. The natural enemies of caterpillars are numerous; almost all insectivorous birds and poultry devour them eagerly; other insects not unfrequently feed upon them; and little maggots developed in their bodies from the eggs of the *ichneumonidæ* cause thousands to perish prematurely. In the northern states there are about 1,000 different kinds of butterflies and moths; as each female lays from 200 to 500 eggs, these species, from a single female each, would on an average produce in a year 300,000 caterpillars; if one half of these were females, the second generation would be 45 millions, and the third 6,750 millions; with such fecundity it may well be imagined that the destructive powers of caterpillars must be very great. The work of Dr. Harris on "The Insects Injurious to Vegetation," under the head of "Lepidoptera," gives an extended and valuable account of the ravages of caterpillars

in America, particularly in New England. Alluding to laws in France and Belgium which require the people to "uncaterpillar" their gardens and orchards, under the penalty of a fine, he thinks similar regulations might be enacted here with advantage, or at least that the towns might offer a respectable bounty for caterpillars by the quart, thus affording remunerative and highly useful employment to children and otherwise idle persons.—For notices of many destructive caterpillars see HAWK MOTH, MOTH, and articles under the popular names of the most noted species.

CATERPILLAR FUNGUS, or **Fungoid Parasites**, a name given to many species of fungi which attack various insects, especially the larvæ of beetles and moths, filling out their bodies, and sending out shoots into the air, so that the animal looks as if transformed into a vegetable. They have been generally described in works on botany, the plant portion having attracted the most attention. Mr. G. R. Gray has specially described the insect portion, taking them up in the usual order of entomological systems. These parasitical plants or fungi infest insects of all orders, and in the larva, pupa, and perfect states; some, however, are from their habitats peculiarly exposed to these growths. The beetles, many of which in all their stages live in the ground, amid decaying vegetable and animal matters, are very liable to these attacks; the growth, no doubt, begins internally, as specimens have been found in which the fungus was just bursting forth from some part of the body; the most usual place for the fungus to appear is from the pectoral surface of the thoracic segments; the larvæ usually lie upon that side, and are generally found dead, and either decayed or dried up; one parasite is ordinarily all that is found on one larva, but two, three, or more are occasionally found. The diurnal lepidoptera have not been seen infested with fungi or moulds, while the nocturnal ones are very much affected; the muscardine, which destroys great numbers of the silkworm, belongs to this class of vegetable parasites. Among orthoptera, the mole cricket; among hymenoptera, ants, bees, wasps, and hornets; among hemiptera, the *cicada*; and among diptera, the flies, are often seen more or less covered with a delicate mould or fungus, which bursts out between the segments of the body, and sometimes grows with great rapidity. From numerous observations, it is certain that life is not extinct when the insect becomes the basis of the parasite. Most of the insects thus affected are vegetable feeders, and it is generally admitted that the spores or seeds of the fungus are swallowed with the food, and that the seeds do not become attached to the exterior of the body and thence penetrate to the interior; some believe that the seeds may also gain admission by the tracheæ or breathing apparatus. These spores are so exceedingly minute as to appear like smoke in the air, and Fries has estimated

above 10,000,000 in a single plant; their minuteness, however, is not so wonderful as that each contains the elements necessary for germination. However admitted, the seeds begin to germinate, gradually grow if the circumstances are suitable, and fill the animal completely with the thallus; the insect retains its external form, though internally its fluids are dried up by the growth of the fungus; the plant then forces its way through the skin at various places, through the articulations, and even through the hard surface of the head. It may be that the vegetable growth does not always depend on its being nourished by the fluids of the insect; but that the latter, enfeebled by the heavy rains that fall periodically in the intertropical regions, where these growths abound, receives the seed, which grows by the influence of external moisture, and by its thallus interferes mechanically with the functions of the insect, and finally destroys it. A vigorous larva might even devour the parasitic seed, which, not finding a suitable nidus, might be voided in the usual way. These growths vary in length from a mere protuberance to 10 inches, and in diameter from a fine hair to one fourth of an inch. Most of them belong to the old genus *sphaeria*, which has been subdivided into many genera, which, with many other apparently very different forms, may be more or less immature growths of totally dissimilar described genera. The fungi infesting insects are not peculiar to them, as they infest all organic and decaying matter.—See "Proceedings of Boston Society of Natural History," vol. xi., p. 120, Feb. 6, 1867.

CATESBY, Mark, an English artist and naturalist, born about 1680, died in London, Dec. 24, 1749. After studying the natural sciences in London, he went to Virginia, and remained in America seven years, returning to England in 1719 with a rich collection of plants. Encouraged by Sir Hans Sloane and other friends of science to revisit America, he arrived in South Carolina in 1722, explored the lower parts of that state, and afterward lived for some time among the Indians about Fort Moore, 300 m. up Savannah river; after which he continued his researches through Georgia and Florida. After spending three years upon the continent, he visited the Bahama islands, constantly occupied in delineating and collecting botanical and zoölogical objects. He returned to England in 1726, and published in numbers his great work on the "Natural History of Carolina, Florida, and the Bahama Islands" (2 vols. fol., 1731-'48; new eds., 1754 and 1771). The figures were etched by himself from his own paintings, and the colored copies were executed under his own inspection. He was a member of the royal society, and wrote *Hortus Europæ Americanus* (1767), and a paper on "Birds of Passage" in the "Philosophical Transactions."

CATFISH, one of the *malacopterygii* or soft-rayed fishes, of the family *siluridae*, and of the genus *pimelodus* of Cuvier; characterized by a

smooth palate, the palatic bones often having teeth, but with no band of teeth parallel to those of the upper jaw; the head ornamented with eight fleshy barbules; skin naked. Dr. Storer describes 16 species as occurring in the fresh-water streams and lakes of North America, and there are about 50 in various parts of the world.—The common catfish, or horned pout (*P. atrarius*, De Kay), is one of the most common fishes of our rivers, and is by many preferred as an article of food to all other fluviatile species except the pickerel; specimens are occasionally met with weighing three quarters of a pound. Length 7 to 9 in.; color dusky, almost black on the head and back, lighter on the sides, and white beneath, in front of the ventral fins, which are behind the pectorals. Upper jaw the longer; tail nearly even and rounded; head smooth and flattened; skin naked and covered with a mucous secretion. It has two fleshy barbules on the top of the head between the snout and eye; at the angle of the upper jaw are two thick fleshy barbules, reaching to the middle of the pectoral fins, and there are four others under the lower



Horned Pout (*Pimelodus atrarius*).

jaw. The mouth is capacious. There are two blunt spines midway between the eye and the opening of the gills; the first ray of the first dorsal fin is strongly spinous; the second dorsal is fatty; the pectoral fins have also a serrated spine; these spines become fixed and immovable at the will of the animal, and serve as formidable defensive weapons. Varieties sometimes occur in this genus without ventral fins, and such have been described as a new genus, *pimapterus*. This species is the most common one in the New England and middle states, and is found in the great lakes and along the Atlantic states from Maine to Florida. It prefers muddy bottoms, as do all the species of the genus.—The great lake catfish (*pimelodus nigricans*, Lesueur) is from 2 to 4 ft. long, weighing from 6 to 30 lbs.; it is found in Lakes Erie and Ontario. This is of a deep olive brown color, and has the tail forked. Other species are the Huron catfish (*P. cænosus*, Rich.), 10 in. long, found in Lake Huron; northern catfish (*P. borealis*, Rich.), 30 in. long, found in the northern regions; the white

catfish (*P. albidus*, Lesueur), of a whitish ash color, 12 to 15 in. long, from Delaware; the mudfish (*P. punctulatus*, Cuv.), 2 to 3 ft. long, of a brown color spotted with black, from Louisiana. Among the large species found in the Ohio river and its tributaries are the *P. æneus* (Les.), 2 to 3 ft. long; *P. furcatus* (Les.), 1 to 4 ft. long; *P. cupreus* (Raf.), 1 to 4 ft. long; *P. limosus*, *P. cærulescens*, and *P. xanthocephalus*.—The catfish are sluggish in their movements, securing their prey rather by stratagem than by swiftness. The female moves about with her young, like a hen with her brood. Though their flesh is generally esteemed in the country and on the western rivers, it is very insipid to persons accustomed to salt-water fishes.—Catfish is a name applied to other species of different genera, and among others to the ferocious *anarrhicas lupus* (Linn.), more properly called wolf-fish.

CATGUT, string made of the dried and twisted intestines of animals. Such strings are usually made from the intestines of sheep, but sometimes from those of the horse, ass, or mule. They are used on violins, harps, and other musical instruments, for the cords of bows, clocks, and whips, and for belting. They are prepared by first being freed from all feculent and fatty substances, then soaked and divested of the outside or peritoneal membrane by scraping, again soaked and the inner or mucous membrane taken away, and still further cleaned by the use of lye. They are next exposed to fumes of burning sulphur to purify them, and are slit and twisted into different sizes. They are then dyed, and afterward, as they are stretched upon frames, dried and hardened by exposure to a temperature of 180° to 200°. Lastly, they are cut off and coiled up for sale. Otto, in his "Treatise on the Violin," says that the best strings are those from Milan, sold by the name of Roman strings; and as these are imitated by inferior cords made in Bohemia and the Tyrol, he gives the following as the marks of the best article: "The Milanese strings are as clear and transparent as glass. The third string should be equally clean as the first. They must by no means feel smooth to the touch, for they are not ground or polished off by any process, as all other manufactured strings are. If a good string be held by one end in the finger and opened out, it will recoil to its former position like a watch spring. Every string when stretched on the instrument should look like a thin strip of glass on the finger-board; those which are of a dull and opaque appearance are useless. Their elasticity is after all the best criterion, as no other strings which I have tried have that strength and elasticity for which the Milanese are so much esteemed."

CATHARINE I., empress of Russia, born according to some in Livonia, according to others in Sweden, about 1685, died in St. Petersburg, May 17, 1727. She was formerly believed to have been the daughter of a Swedish quartermaster, John Rabe, but is now more generally

represented as the daughter of a Lithuanian peasant, Skavronski; her own original name was Martha. Left an orphan in a village of Livonia, she was taken care of by the sexton of the place, and subsequently by Glück, the Protestant minister at Marienburg, who educated her with his children. In 1701 she married a Swedish dragoon of the garrison of Marienburg; but the campaign of 1702, in which he had to serve, and the capture of Marienburg (Aug. 23) by the Russians, under Sheremetieff, separated them for ever. Martha, together with the family of her protector, Glück, was made captive by the Russian general, who treated the old clergyman kindly, but retained the females. At the distribution of the spoils, she was allotted to Gen. Bauer, whose mistress she was until she was ceded by him to Prince Menshikoff. It was in the house of the latter that Peter the Great saw her, was captivated by her beauty, and made her his mistress (1703). She adopted the Greek creed, and with it the name of Catharine Alexievna. In 1706 she bore a daughter, Catharine; in 1708 (after having been privately married to Peter) Anna, afterward duchess of Holstein-Gottorp, and mother of Peter III.; in 1709 Elizabeth, afterward empress of Russia. She maintained her influence over Peter by her vivacity, activity, and good temper. She shared the troubles and fatigues of his campaigns, and frequently calmed the wild outbreaks of his savage temper. When in 1711 his great rival, Charles XII., who after the defeat of Poltava (1709) had found refuge and protection in Turkey, had succeeded in arming that empire against the Russians, and Peter, after an imprudent march, found himself reduced to the extremity of starving on the banks of the Pruth, or surrendering his army, Catharine, with the assistance of Ostermann and Shafiroff, saved him by bribing the Turkish grand vizier with her jewels. Peter proved his gratitude by acknowledging her as his wife in 1712, and declaring her empress in 1718. As such she was crowned in Moscow in 1724. The determination of Peter to make her his successor was shaken by his suspicions of her conjugal fidelity, and still more in 1724 by his conviction of her infidelity, in consequence of which the chamberlain Moens was beheaded (ostensibly for mismanagement in office), his sister ignominiously flogged, and his two sons sent to the army in Persia. It has been asserted that Catharine, having been shown by Peter the head of Moens, still hanging on the scaffold, said calmly, "What a pity that the people of the court are so corrupt." She succeeded, however, in strengthening her position by reinstating Menshikoff in the favor of Peter, which he had previously lost by his devotion to her. But still so doubtful was her situation, that at the death of Peter (Feb. 8, 1725), which was kept secret until her succession was secured, she could not avoid the suspicion of having poisoned her husband. The archbishop of Pskov, Theophanes, declared

under oath to the people and the army that Peter on his deathbed had designated her as the worthiest of succession, and the guards, the synod, and the high nobility gave their consent, and the people their oath of fidelity to the first "empress" and autocrat of all the Russias. The policy of Peter was continued under the leading influence of Menshikoff; the Russian academy of sciences was founded, silver mines were opened in Siberia, and the naval exploring expedition under Behring was fitted out. But soon the caprices of the empress, who was guided by favorites, and intemperate in drinking, were felt in the management of affairs, and blunders committed, while her ruined health prepared a sudden end. Her successor was Peter II., the grandson of Peter and son of the unfortunate Alexis.

CATHARINE II., empress of Russia, born in Stettin, May 2, 1729, died in St. Petersburg, Nov. 17, 1796. She was the daughter of Christian August, governor of Stettin, who was afterward reigning prince of Anhalt-Zerbst, and field marshal general of Prussia. Her mother was a princess of Holstein-Gottorp. Her parents gave her the names Sophia Augusta, and a careful education. At an early age she was chosen by the empress Elizabeth, at the suggestion of Frederick the Great, to become the wife of her nephew and successor, Peter III. Her mother brought her to the court of Russia, where she adopted the Greek creed, received the name of Catharine Alexievna, and was married in September, 1745. But all the expectations she may have formed of a life of magnificence, influence, and delight as future empress of the greatest monarchy of the world, soon vanished under the indifference and repulsive treatment of her husband, who, though not incapable of good emotions, was rude, dissolute, and passionate. Her fiery and lively temper could not be contented with the consolation of continued studies, in the long retirement in which she lived during the life of Elizabeth, and she indulged in amorous connections which were no secret to any one. Among the persons who surrounded Peter and herself, Soltikoff won her liveliest affection by his spirit and good looks, and lost it only when favor and envy had sent him as ambassador to foreign courts. At that time Catharine became mother of Paul, afterward her successor in the empire. The handsome and highly accomplished Poniatowski won the place of Soltikoff at his first appearance at the court, and was protected in her favors by the empress Elizabeth, who caused Augustus III., king of Poland, to appoint him as his ambassador; but he was soon persecuted by intrigues of representatives of other courts, who saw in his sympathies for England, and in his influence over Catharine and Peter, a danger for the French-Russian-Austrian alliance. He was recalled, and Gregory Orloff became the object of her favors. When Peter succeeded Elizabeth, Jan. 5, 1762, the ill feeling between him

and Catharine became still more embittered, and the conduct of both, particularly the gross public amours of Peter, gave each sufficient cause for hatred. Catharine was threatened with repudiation by her husband, and the Orloffs and their friends were ready to save and revenge her. The hetman Razumovski, Count Panin, and Princess Dashkoff, a bold and enterprising woman, became their chief assistants in the conspiracy against Peter, which was greatly promoted by the general antipathy created in the nation and army by the Prussian predilections and discipline, as well as by the character and policy of the unfortunate monarch, and was eagerly joined by malcontents, romantic adventurers, and ambitious courtiers. But the plot was nearly detected and one of the conspirators imprisoned, when they hastened its execution. In the night of July 8-9, 1762, Catharine came over from Peterhof to St. Petersburg, a part of the way on a peasant's wagon, and appeared before the guards, who hailed her as empress, though, according to the original plan, her son Paul was to be declared emperor and herself regent; but this had been changed by the Orloffs, and the future senator Teploff read, instead of the prepared manifesto, a new one in the Kazan church. Peter was soon seized, and after a few days strangled in prison. The sooner to gain pardon for her part in the crime, Catharine made the most splendid promises to the nation, flattered its prejudices, exhibited great devotion to the national religion and its priests, was crowned with great pomp at Moscow, and made a show of extraordinary zeal for improvements in industry, commerce, and the navy, and for reforms in the administration of justice, as well as in the management of the external affairs of her vast empire. Courland was compelled to depose its duke, Charles of Saxe, and to submit again to the rule of Biron, who had made himself hateful by his cruelty. Her influence prevailed in Poland after the death of Augustus III. (1763), in the election of her favorite Poniatowski as king under the name of Stanislas Augustus, from whose affection and weakness she justly expected the extension of her influence over the neighboring state, distracted as it was by religious and civil dissensions. But this happy commencement could not allay the hatred of national malcontents; attempts against the empress were plotted at Moscow and St. Petersburg, with the aim of setting upon the throne of the czars Ivan, son of Anna Carlovna, who had already atoned by 24 years of imprisonment under Elizabeth and Catharine for having worn as a child, for a few months, the imperial title before the accession of the former. The violent death of Ivan, in his prison at Schlüsselburg (1764), put an end to these schemes, and Catharine could now enjoy more easily the pleasures and festivities of her court, troubled but little by its intrigues about favors and favorites. The convocation at Moscow of representatives from all

the provinces of the empire for discussing the reorganization of justice, was a new manifestation of her political activity, as were the rules elaborated by her, and read in the first session, of her political wisdom. But the rude Samoyeds spoke of oppression by their governors, and a proposition for the enfranchisement of the serfs was soon made. Catharine was afraid of the consequences, and hastily dissolved the assembly, who declared her mother of the country. Greater were the results of her external diplomacy. Poland, undermined by her intrigues and her protection bestowed on the dissidents, soon became a prey to its neighbors. The confederation of Bar (1768), under the Pulaskis, Potocki, and other patriots, the weak opposition of France to Russia, and a declaration of war by the Turks, could not save that unhappy country; and its first division by Russia, Austria, and Prussia ensued in 1772, and Catharine received a proportionate share. The Turks were humbled by her armies under Rumiantzeff, on the Pruth and on the Kagul (1770), by the conquests of Khotim and Bender, as well as by her fleet under Alexis Orloff, which won the great naval victory of Scio, and burned the Turkish fleet in the bay of Tchesme; and the last disasters compelled the Porte to accept the peace of Kutchuk-Kainarji (1774), and to cede Kinburn, Azov, Yenikale, Kertch, and both Kabardas to Russia. The Crimea was made independent, soon to become a prey to Russia. Having happily subdued and severely punished the revolt of the Cossack Pugatcheff, a pseudo-Peter, in the eastern provinces (1771-4), she now formed the plan of expelling the Turks from Europe, and founding a new Byzantine empire under a prince of her house. This scheme, favorably regarded by some philosophers of France, was eagerly promoted by her new favorite, the ambitious Potemkin, who ruled her no less arrogantly than he did the empire. One of the gates of Moscow received this inscription, "Way to Constantinople;" one of her grandsons the name of Constantine; and plans were made on the banks of the Neva for the restoration of Sparta and Athens. After a journey through the eastern provinces which had been the scene of the revolt, she undertook a new one, in 1787, through the southern parts of her empire, to the lately conquered Taurida (in part the ancient Tauris). Potemkin made this a most magnificent triumph. The eyes of the empress were dazzled by enchantments; palaces rose on desert prairies, to shine for a day; villages and cities, of which only the walls were real, were seen from afar, covering the barren plains of the Tartar nomads; masts and flags rising above the sands showed fictitious canals; festivities and bonfires followed each other; and dances and songs, got up by official order, were supposed to show the happiness of a population of a hundred nationalities. Catharine, who delighted in the applause of the French philosophers, amused herself and her court at the same time with translating Mar-

montel's *Bélisaire*, but still pursued her diplomatic schemes. Poniatowski, who came to see her after 23 years, near the frontiers of his dismembered state, was repaid with kind promises for ancient personal affection and new political fidelity. Joseph II. of Austria, who came to Kherson, was won for a common war against Turkey, which ended for Austria with his death (1790), and without gain, and for Russia, after the conquest of Otchakov by Potemkin, after the great victories of Suvaroff, and his bloody conquests of Ismail and Bender, with the peace of Jassy (1792), and the acquisition of Otchakov and the country between the Bog and Dniester. This result, so slight in comparison with the expected overthrow of the Turkish empire, was owing in part to a war with Gustavus III. of Sweden, who marched against St. Petersburg, but was happily checked in Finland by his officers refusing to advance, and was thus compelled to make peace (1790); in part to the opposition of England and Prussia; but principally to the bravery of the Turks in defence of their country. The progress and victories of the French revolution, though giving her a kind of satisfaction by the humiliation of several states once mighty, filled Catharine with horror, and made her soon forget all her predilections for France, and her own vaunted liberalism; she assisted the *émigrés*, broke off every communication with the French government, and even made an alliance with England. Poland was in the mean time the chief object of her attention. Catharine, while at war with Turkey, had approved of its new constitution of May 3, 1791, which promised to give union and vigor to the nation, as did also Frederick William II. of Prussia, who was at war with France. But scarcely were these wars ended when Poland was treacherously attacked from both sides. A Russian army of 100,000 men was sent to support the aristocratic faction that had formed the confederation of Targovitz against the constitution. The nephew of the king, the future French marshal, Joseph Poniatowski, in vain led the Polish army against them; Kosciuszko proved in vain to be a worthy disciple of Washington. The king, persuaded by Catharine, deserted them, and went over to the confederation, and the second partition of Poland followed, executed by Russia and Prussia alone. The Russian cannon compelled the diet of Grodno to sanction it (1793). The great rising of the betrayed nation in the following year commenced with the massacre of the Russians, and with glorious victories under Kosciuszko as dictator, but ended with his defeat at Maciejowice (Oct. 10, 1794), and with the taking of Praga (Nov. 3) by Suvaroff, who repeated there the slaughter of Ismail and Bender. "Bravo, field marshal!" was Catharine's answer to his report, "Hurrah, Praga—Suvaroff." The three great neighbors of Poland now took the whole of it, and destroyed even its name (1795). A year before Catharine had annexed Courland to Russia. She

next undertook a war against Persia, but died of apoplexy, after an agony of 30 hours, leaving her empire, so greatly enlarged, to her son Paul.—Catharine was possessed of great talents, susceptible of great ideas, and showed often a manly spirit and energy; her ambition appeared grand; but at the same time she was a woman in caprice, a slave of her sensuality and vanity, extremely selfish, and sometimes cruel. Her numerous favorites, some of them her tools and some her masters, were elevated by their official situation in the palace, by privileges, promotions, and presents, to dignity in the state; while she was, on the other hand, prompted by the love of glory to flatter the representatives of public opinion, particularly in France, to invite Voltaire to her court, to call D'Alembert to complete the French *Encyclopédie* in St. Petersburg, to suffer the familiarities of Diderot, to have a regular literary agent (Grimm) in Paris, and to write herself several books in French; to promote literature and art, industry and agriculture, in her empire; to reform its laws, and attempt the abolition of many abuses; to build fortresses, cities, canals, hospitals, and schools; to organize exploring expeditions on land and sea; to annex and to conquer. She had the satisfaction of being called the Semiramis of the North, of being ranked by philosophers with Lycurgus and Solon, of hearing the words of Voltaire, "Light comes now from the North." But her fame was only a transient applause; her reforms, undertaken for show, vanished without result; most of her works came to nothing before she died; and her civilization did more to corrupt Russia than to elevate it.—Lives of Catharine II. were written by Castéra, J. G. von Struve, and Tannenbergh; and Herten published in London (1859) *Mémoires de l'impératrice Catherine II. écrits par elle-même et précédés d'une préface*.

CATHARINE OF ARAGON. See HENRY VIII.

CATHARINE OF BRAGANZA, queen of England, born in 1638, died Dec. 31, 1705. She was the daughter of John IV., after 1640 king of Portugal, and in 1662 married Charles II., king of England, bringing her husband, besides a rich dowry, Tangiers in Africa and Bombay in India. She had been bred in a convent, and was not accustomed to the free conversation and licentious manners which prevailed at the court of her husband. Her influence was unavailing to produce any change, nor was she able to restrain the dissolute conduct of the king or to gain his love. In 1678 accusations against her of plots in favor of the Catholic religion were received favorably by the house of commons, but rejected by the lords. After the death of Charles (1685), she was treated in England with attention and respect. She returned to Portugal in 1693. Made regent of that country by her brother, Dom Pedro, in 1704, she proved her ability in the war with Spain, which she carried on with success, though 67 years old.

CATHARINE FIESCHI ADORNO, Saint, born in Genoa in 1447, died Sept. 14, 1510. Her father was viceroy of Naples. At the age of 13 she desired to consecrate herself to God in the religious state; but in obedience to her parents she married at the age of 16 Julian Adorno, a gay young nobleman of Genoa. Her life with him was for ten years a series of sorrows, sufferings, and mortifications. He was profligate, brutal, and prodigal in the use of the fortune which she brought him. In a short time they found themselves reduced to poverty; but her patience and good example caused his reformation, and he died a penitent. After his death Catharine was for many years mother superior of the great hospital of Genoa, and extended her care to the sick and suffering throughout the city. St. Catharine, next to St. Theresa, is the most profound female writer that the Roman Catholic church has produced. Her two principal treatises, which for the most part may be considered as the records of her own experience, are entitled "Purgatory" and "Dialogue between the Soul and the Body." She was canonized in 1737 by Clement XII., and her anniversary is celebrated on Sept. 14. An American translation of her treatises and of her life, written by her confessor, Marabotto, appeared in 1858.

CATHARINE OF FRANCE, or of Valois, queen of England, born in Paris, Oct. 27, 1401, died in the abbey of Bermondsey, England, Jan. 3, 1438. She was the youngest child of Charles VI. of France and Isabeau of Bavaria. Henry V. of England, having asserted his claim to the crown of France, applied for her hand, but demanded an enormous dowry in money and the cession of Normandy and several other provinces. The court of France declining these terms, Henry V. invaded the country, and, after the victory of Agincourt and the capture of Rouen, renewed his application, which was this time favorably entertained. By the treaty of Troyes, May 21, 1420, it was agreed that Henry should receive the hand of Catharine and succeed to the throne of France after the death of Charles VI., the regency of the kingdom being placed in his hands until that time. They were married at Troyes, June 2, with great ceremony, and in the following year sailed for England, where Catharine was crowned Feb. 24, 1421. Henry, being obliged to return to France, left his young wife in England, where she gave birth on Dec. 6 to a son, afterward Henry VI. She was soon recalled to France, where she found her husband dying. Immediately after his death (Aug. 31, 1422), his infant son was proclaimed king of France and England. A few years later, but when is not certainly known, Catharine was secretly married to Owen Tudor, a young and handsome Welsh knight of good family, who had fought at Agincourt, and after holding the office of squire of the body to Henry V. had become clerk of the wardrobe to Catharine. By this husband she had three sons, the eldest of

whom, Edmund of Hadham, so called from Hadham house, where he was born, was made earl of Richmond by Henry VI., who also procured his marriage with Margaret Beaufort, the heiress of the house of Somerset. The issue of this marriage was a son, afterward Henry VII., the first sovereign of the house of Tudor. The marriage of Queen Catharine with Owen Tudor does not seem to have been discovered till a few months before her death. She was sent to a convent and Tudor to Newgate jail, whence he escaped to Wales, and after some years was taken into favor by Henry VI., in whose service he fought against Edward IV., by whom he was taken prisoner and put to death in 1460.

CATHARINE DE' MEDICI, queen of France, born in Florence in 1519, died at Blois, France, Jan. 5, 1589. She was the only daughter of Lorenzo de' Medici, and in 1533 Pope Clement VII., her uncle, negotiated her marriage with Henry, duke of Orleans, second son of Francis I. Entering the court of France in a somewhat secondary position, she applied herself to conciliate all parties, win all affections, and be everything to all persons, affecting in the meantime to care nothing for affairs of state and to shun the turmoil of business. When she came to France, the duchess d'Étampes and the celebrated Diana of Poitiers, afterward duchess of Valentinois, were ostensibly the mistresses of her father-in-law, the king, and of her husband; and to both she assiduously paid her court, though they notoriously hated one another. His elder brother, the dauphin, having died, Henry in 1547 succeeded his father as king of France. Catharine, however, did not alter her policy or interfere, whether in the affairs of state or in his social and domestic arrangements, with her husband, or with his mistress. In 1559 Henry was accidentally killed at a tournament held at the castle of Tournelles; and his son, Francis II., a delicate stripling, weak both in health and intellect, lately espoused to Mary Stuart, queen of Scots, who was on her mother's side a Guise de Lorraine, succeeded to the throne. During his short reign Catharine did not exercise much influence at court, for the king was completely under the rule of his wife and her maternal uncles, the celebrated Le Balafre, Francis duke of Guise, and the cardinal Lorraine, who were not favorable to the schemes of the queen mother. Catharine, who cared nothing for religion, connected herself with the Huguenot leaders, Condé, Coligni, and the king of Navarre, and a plan was laid for seizing and imprisoning the young sovereigns at Amboise, bringing the Guises to the scaffold, and governing the realm by a council of regency, composed of the Huguenot princes under the guidance of Catharine. The plot, however, was detected; the princes were compelled, in order to avoid the suspicion of complicity in the conspiracy, to witness the slaughter of their partisans; while Catharine immediately deserted

them, and joined the party of the Catholic league. The next plan was to assassinate the duke of Condé in the presence of both Francis and Mary at Orleans, which city they were about to visit in state, on a royal progress; and on Francis positively refusing to give his assent to the murder, one of the Guises is said to have exclaimed, "Now, by the double cross of Lorraine, but we have a poor creature for our king!" Francis II. died soon after, and such was the condition of court morals at the time that his death was attributed to poison, dropped into his ear while sleeping, not without the privy of Catharine, who by the accession of Charles IX., a minor, succeeded as regent (1560) to the actual if not the nominal sovereignty of the realm. She now gave full swing to her atrocious genius. She first plunged all her children into such licentious pleasures and voluptuous dissipations, that they were speedily unfitted for mental activity or exertion. On the occasion of the marriage of her daughter, Marguerite of Valois, with Henry of Navarre, Catharine prevailed on Charles to give the orders for the fatal massacre of St. Bartholomew's, an event which greatly increased her power, of which she boasted to Catholic governments, and which she excused to Protestant ones. Charles IX. died in 1574, and the belief was that he had been poisoned by his brother Francis, duke of Alençon, with the connivance of his mother. Her son Henry of Valois, then in Poland, of which he had been elected king by the diet, left that country secretly, returned to France, and claimed the throne. During his reign, which ended Aug. 2, 1589, Catharine had until her death a principal but concealed share in the plots and party contests which distracted France. She is supposed to have instigated the death of Henry of Guise and his brother the cardinal, who were assassinated by the king's order. This was the ruin of Henry and of the schemes of Catharine. It united all Catholic France against the king, brought about his death by assassination, and made her an object of aversion to all parties. She died unheeded in the fierce strife of wars which she had stirred up.

CATHARINE PARR, queen of England, the sixth and last wife of Henry VIII., born at Kendal castle, Westmoreland, about 1513, died at Sudely castle in Gloucestershire, Sept. 7, 1548. She was the daughter of Sir Thomas Parr, who was at the time of her birth master of the wards and comptroller of the king's household. He died when she was but five years old, leaving her education in charge of her mother, under whose tuition and care Catharine became one of the most learned and accomplished women of her time. She was married when very young to Edward, Lord Burgh, an elderly widower, who died in 1528. Shortly after this the family of the Parrs, already distantly connected with the royal house, became more nearly allied with it through the marriage of Catharine's brother William to a

kinswoman of the king; and two of the Parrs now became attached to the court. These circumstances seems to have led at this early day to some degree of friendly intercourse between Henry and Catharine. While still under 20 years of age she was married again, this time also to a widower, John Neville, Lord Latimer, an earnest Catholic, who died in 1542 or 1543. Soon after his death Catharine embraced the Protestant faith, of which she became from this time an earnest friend and defender, her home at Snape hall being a resort of some of the most famous reformers. During this second widowhood her hand was sought by Sir Thomas Seymour; and she had already consented to marry him, when she received the alarming and unwelcome news that she had been selected for the sixth wife of the king. It was impossible to resist the royal will, and Catharine was married to Henry on July 12, 1543. The influence of the new queen at court was excellent. She behaved toward Henry with the greatest tact, and used his favor, which she successfully retained, for the best purposes, even venturing to occasionally interfere in behalf of persecuted Protestants. She devoted much of her time to study, composition, and scholarly pursuits, and impressed the importance of these upon the king's children. Her relatives received places of influence, and she so skilfully managed her husband's caprices as to gain some power even in state affairs. When Henry went to France in 1544, he left her regent of the kingdom. Even her known sympathy for the unfortunate Anne Askew did not suffice to turn the fickle king against her; and it was a comparatively trivial matter which brought her into her first real danger of sharing the fate of her predecessors. In one of the theological discussions in which she occasionally engaged with Henry, she allowed herself to support her views with more warmth than usual, and he became greatly incensed. One of her Catholic enemies who was present took advantage of the king's anger to poison his mind against the queen, and, aided by others, induced him to permit several of his councillors to consult as to the drawing up of a warrant against her. This warrant and an order for her arrest were actually signed a few days later; but Wriothesley, the lord chancellor, to whom they had been given, accidentally dropped them, and they were found and carried to Catharine. Thus warned, she so skilfully flattered and soothed her husband that he became completely reconciled to her. He saluted Wriothesley, when he came to arrest the queen, with a torrent of abusive epithets, and bade him "avaunt from his presence." From this time Catharine enjoyed apparent favor till Henry's death in 1547; but there seems little doubt that in secret the king considered several plans for ridding himself of her. She did not long remain a widow. After passing a few months in her jointure house at Chelsea, she became the wife of her old lover Sir Thomas Seymour, now

lord admiral. But her married life with him was embittered by his familiarity with the young princess Elizabeth, and by his growing neglect of herself. Though without children by her former marriages, she bore Sir Thomas a daughter on Aug. 30, 1548, the infant's birth costing her her life.—Catharine's literary works are admirable specimens of a pure early English style. She wrote "Queen Catharine Parr's Lamentations of a Sinner," published by Lord Burleigh in 1548. In her lifetime she published a volume of prayers and meditations. Her letters are preserved in Strype's annals, Hayne's collection of state papers, and in the Ashmole collection. She employed scholars to translate from the Latin into English Erasmus's paraphrase on the New Testament, and wrote a Latin letter to the princess, afterward Queen Mary, exhorting her to translate the paraphrase on St. John.

CATHARINE PAULOVNA, queen of Würtemberg, grand duchess of Russia, daughter of Paul I. and younger sister of Alexander I., born May 21, 1788, died Jan. 9, 1819. In 1809 she married George, duke of Holstein-Oldenburg, who died in 1812. She accompanied her brother Alexander on his campaigns in Germany and France (1813-'14), and to Paris, London, and the congress of Vienna (1815), assisting him by her talents and resolute spirit. In 1816 she married William, crown prince of Würtemberg. During the famine of 1816 in that country she proved her benevolence by the formation of female associations and an agricultural society. She was active in promoting the education of the people. She left two sons by her first and two daughters by her second marriage.

CATHARINE OF SIENA, *Saint*, born at Siena in 1347, died in Rome, April 29, 1380. She entered at 20 years of age the order of Dominican nuns, and became distinguished for her charity and devotion. She restored the Florentines to the favor of Gregory XI., and exhorted that pontiff to leave Avignon for Rome. She wrote in defence of Pope Urban VI., when his authority was contested by Clement VII. She was canonized by Pius II. in 1461, and her anniversary is celebrated on April 30. The works of this saint are principally treatises upon devotional subjects, letters, and poems, collected in *Opere della serafica Santa Catharina* (4 vols., Siena and Lucca, 1707-'13).

CATHARISTS, or *Cathari* (Gr. *καθαρός*, pure), a name assumed by heretics of the middle ages to justify their opposition to the alleged corruptions of the Roman Catholic church. They were also called in Italy Patavini or Paterini, in France Publicani, and at a later period Bulgarians; and from the time of the Albigenian war the name Albigenes became more common than any other. (See ALBIGENSES.) According to some, the Catharists appeared as early as 1035 near Turin, but the first undisputed trace of them is in 1101 at Agen. They spread from southern France into the neigh-

boring countries. Their central point in France was Toulouse, and in upper Italy, Milan. In order to secure uniformity of policy and doctrine, they held in 1167 a synod at Toulouse, at which even a Catharist bishop of Constantinople, Nicetas, was present. As they were protected by a considerable number of the nobles, the decrees of the popes and councils against them remained without effect, and a crusade against them in 1181, headed by the cardinal legate Henry, abbot of Clairvaux, was likewise unsuccessful. At the close of the 12th century a branch of the sect passed from Dalmatia into Bosnia, where they became very numerous. In southern France they even became the dominant party, but the issue of the protracted and bloody Albigensian war left them without patrons and at the mercy of the inquisition. Nevertheless they maintained themselves in southern France till the 14th century, increased in upper Italy and in Bosnia and Bulgaria, where they appear to have for some time been in the ascendant, and spread more or less into other European countries. In England, where they made their appearance in 1159, they were quickly suppressed. In most other countries they succumbed to the inquisition and to crusades in the first half of the 14th century. In Bosnia, however, they became once more predominant, under King Stephen Tvartko, as late as 1376, and in southern France and the Basque provinces the Cagots traced their origin to the Albigenses.—Our knowledge of the Cathari is almost exclusively derived from Roman Catholic writers, and chiefly from the inquisitors, who had the mission, if necessary, to exterminate them by fire and sword. Their reports frequently differ. According to some writers, they were distributed into three chief divisions: the Albigenses, who professed dualism, and the Concorrezenses and Bagnolenses, who assumed one supreme principle. Others do not give any of these names, and merely distinguish between the dualistic Cathari and the adherents of one supreme principle. The former assumed two opposite principles, without beginning and without end; the latter believed in one supreme God, but generally rejected the doctrine of the Trinity. All parties appear to have regarded Satan as the creator of the visible world, and as the Jehovah of the Old Testament. From him, in the opinion of the Catharists, the greater portion of men derive their origin, and they cannot be redeemed; but there is also a higher class of men, whose souls are the fallen angels, and for the redemption of whom the God of light sent the angel Jesus, who taught them that they were of a higher nature, and that by despising everything material they could emancipate themselves from the prince of this world. The ancient system of the strict dualists is said to have been considerably modified about 1230 by their bishop Johannes de Lugio, who taught that good and evil had limited each other from eternity, and had already intermingled in the

world above. The Cathari rejected all the fundamental doctrines of the Catholic church, as the Trinity, incarnation, and resurrection. They renounced baptism by water, and laid great stress on the baptism of the Spirit, which should be performed by the imposition of hands in connection with prayer. Their church edifices had neither images, cross, nor bell, and the worship consisted only of the reading and exposition of a passage of the New Testament, followed by the benediction. Marriage was classed among the mortal sins, inasmuch as it increases the number of fallen souls. One of the most important rites of the sect was the *consolamentum*, consisting of the imposition of hands and the putting on of a garment; by means of this rite the members also advanced into the higher class of the *perfecti*, which had to practise the most rigorous asceticism, while those of the lower class (*credentes*) are said to have been at liberty to give themselves to a licentious life, provided they vowed to enter at some future time the higher class. Their hierarchy consisted of four degrees, the highest of which was that of the bishop. Some are of the opinion that a pope stood at the head of the hierarchy.—Besides the New Testament, the Cathari held the apocryphal book *Visio Isaia* in high estimation. A Catharist translation of the New Testament in a Romaic dialect, with an appendix containing a short liturgy, an act of confession, acts of reception among the *credentes* and among the *perfecti*, some special directions for the faithful, and an act of consolation in case of sickness, was discovered in 1851. The best works on the Catharists are Schmidt's *Histoire et doctrines de la secte des Cathares* (2 vols., Paris, 1849) and Hahn's *Geschichte der Ketzerei im Mittelalter* (2 vols., Stuttgart, 1845-'50).

CATHARTICS (Gr. *καθαρτικός*, from *καθαίρειν*, to cleanse), medicines used to promote evacuation of the intestines. Their number is very large, and they may be divided into several classes, such as mechanical, including unbolted meal of various kinds, fruits, and mustard seed; oily, as croton and castor oil; saline, as magnesia and its carbonate, sulphate, and citrate, sulphate and phosphate of soda, bitrate of potassa, &c.; acid or bitter, as rhubarb, senna, colocynth, and aloes; resinous, as jalap, scammony, gamboge, and podophylline; and mercurial, calomel and blue pill. Their action varies, partly with the dose, from the mild and almost natural effect of magnesia and aloes, to the violent purging of jalap, gamboge, or elaterium. For a more detailed statement of individual peculiarities, see the several titles.—The *modus operandi* of cathartics is chiefly in stimulating the intestines to more active contraction, and thus either hastening the discharge of the more watery contents of the upper bowels, before they have time to experience the loss of fluid which usually takes place by absorption in the large intestine, or else unloading the colon of its normal contents. The saline cathartics are probably always absorbed

to some extent, and if they fail to act upon the bowels may be eliminated in part or wholly by the urine. Some of the others, as senna and scammony, demonstrate their occasional absorption by causing purgation in infants when taken by the nurse. The coloring matter of rhubarb sometimes appears in the secretions. —Cathartics are very largely used, both singly and in the most various combinations with each other and with tonics and aromatics, from the natural salines of mineral springs to the numerous quack compounds with which the country is flooded. They are probably more abused than any other class of drugs, since a resort to them is so easy as to often lead to a neglect of highly important hygienic rules. They should never be allowed to take the place of due attention to diet, exercise, and habit. The common use of powerful cathartics at the beginning of acute diseases, to “work off a cold” for instance, is as a rule to be deprecated. Their use, however, is often necessary, not only to relieve constipation, but to withdraw water primarily from the intestinal canal, and secondarily from other parts of the body, as in dropsy, or to control the circulation by calling a large amount of blood into the capacious veins and arteries of the abdomen. The uterus, from its nearness to the bowel, may be injuriously affected by the action of violent purges.

CATHCART, William Shaw, earl, a British general and diplomatist, born at Cartside, near Glasgow, June 17, 1755, died at Cartside, near Glasgow, June 17, 1843. He was the eldest son of the 9th Baron Cathcart, studied law, although without intention of practising that profession, and on the breaking out of the American war entered the British army, where he speedily rose to be aide-de-camp to Gen. Spencer Wilson and Sir Henry Clinton. Subsequently he commanded the 29th regiment of infantry, and finally was appointed quartermaster general. Recalled to England, he joined the Walcheren expedition with the rank of brigadier general. After distinguishing himself at Bommel and elsewhere on the retreat, he returned to England, where he was promoted. In 1807 he took his seat as a representative peer of Scotland. The same year he was appointed commander-in-chief of the troops destined to act against Copenhagen, and on the fall of that city and capture of the Danish fleet was created a peer of England as Viscount Cathcart and Baron Greenock. In 1812 he was sent as minister plenipotentiary to Russia. The emperor Alexander being then with the army, Lord Cathcart joined him at headquarters, where he remained during the campaigns of 1813 and 1814. He entered Paris with the allied sovereigns, subsequently acted as British plenipotentiary at the congress of Vienna, and was made an earl, June 18, 1814. On the final overthrow of Napoleon he again repaired to Paris and signed the treaty of peace which followed Waterloo. He was afterward for some time minister to Russia. His later

years were passed at his country house of Cartside.

CATHEDRAL (Lat. *cathedra*, a seat), a church containing a bishop's throne or seat, the chief church of the diocese. Its usual form is a Latin or Greek cross, and it is not distinguished architecturally from the basilica. In the old basilicas there was a transverse hall at the end, not intentionally resembling a cross; but more modern architects, perceiving the resemblance, changed the position of the transept, making the church cruciform. The church of St. John of Lateran at Rome, founded by Constantine, is the episcopal church or cathedral of the pope, and bears over its chief portal the inscription, *Omnium urbis et orbis ecclesiarum mater et caput*, “Mother and head of all the churches of the city and the world.” At its chief altar none but the pope can read mass, for it covers another ancient altar at which the apostle Peter is said to have officiated. The basilica of St. Peter's at Rome is surpassed by no cathedral in antiquity and splendor, and equalled by none in magnitude. In the year 90 Anacletus, bishop of Rome, who was said to have been ordained by St. Peter himself, erected an oratory on the site of the apostle's burial, after his crucifixion. In 306 Constantine built a basilica on the spot. In 1450 Nicholas V. commenced a building on plans of Bernardino and others. Paul II. continued it, and Julius II. secured the services of Bramante, whose plan was a Latin cross and an immense dome on arches springing from four large pillars. The latter died in 1514, and Leo X. appointed Giuliano Sangallo, Giovanni da Verona, and Raphael, who strengthened the pillars for the dome; but Sangallo dying in 1517, and Raphael in 1520, Leo employed Baldassari Peruzzi, who changed the plan to a Greek cross. Paul III. employed Antonio Sangallo, who returned to Bramante's plan; but he died very shortly, and the pope appointed Giulio Romano, who also died. The work was then given to Michel Angelo, then in his 72d year. Paul III. died in 1549, but Julius III. continued Michel Angelo in his place, giving him full authority to change whatever he wished in the building as it then stood. He returned to the Greek cross, and strengthened the piers for supporting the dome. The drum of the dome was completed before he died in 1563. Pius V. appointed Vignola and Pirro, with orders that they should adhere to Michel Angelo's plans. The present dome, finished in 1590 by Giacomo della Porta, is lighter and higher than that designed by Raphael. Sixtus V. gave 100,000 gold crowns annually toward its completion. In 1605 Paul V. employed Carlo Maderno, who changed the ground plan back to the Latin cross. The nave was finished in 1612, the façade and portico in 1614. The church was dedicated by Pope Urban VIII. on Nov. 18, 1626. Under Alexander VII., in 1667, Bernini finished the colonnade. The building of St. Peter's, from its foundation in 1450 till its dedication, occupied 175 years;

and if we include the work done under Pius VI., three and a half centuries passed before it was completed, during which time 43 popes reigned. The dimensions of the church are as follows: length of the interior 613½ English ft., of transept from wall to wall 446½ ft.; height of nave 152½ ft., of side aisles 47 ft.; width of nave 77–89 ft., of side aisles 33¾ ft.; circumference of pillars which support the dome 253 ft. The cupola is 193 ft. in diameter. The height of the dome from the pavement to the base of the lantern is 405 ft., to the top of the cross 448 ft. The dome is encircled and strengthened by six bands of iron. A stairway leads to the roof, broad and easy enough to allow a loaded horse to ascend. The annual cost of keeping the church in repair is 30,000 scudi.—At Milan the first cathedral was destroyed by Attila; the next one was injured by fire; and the first stone of the present structure was laid by Giovanni Galeazzo Visconti on March 15, 1387. The ground plan is a Latin cross terminated by an apsis. Its dimensions are: length 486 ft.; breadth of body 252 ft., between the walls of the transept 288 ft.; width of nave from centre to centre of the columns 63 ft., which is double the width of the side aisles; height of the crown of the vaulting of nave 153 ft.; height from the pavement to top of the statue of Madonna 355 ft. The interior is divided into a nave and four aisles, by four ranges of clustered pillars. Fifty-two pillars, each formed of eight shafts, support the arches of the roof. These pillars are 80 ft. high, viz.: a base 4 ft., shaft 57 ft. 6⅝ in., capital 18 ft. 6⅓ in.; diameter of shaft 8 ft. There are fine interior doorways in Roman style. The pavement is laid in mosaic in red, blue, and white marble. The white marble exterior has niches and pinnacles for 4,500 statues, of which over 3,400 are completed at present.—The duomo at Florence is one of the most beautiful specimens of the Italian-Gothic style. It was begun in 1298 upon the plan of Arnolfo di Cambio da Calle, and was finished about 1444. Several architects were employed upon it, among them Giotto, Taddeo Gaddi, and Andrea Orgagna. Its completion was intrusted to Brunelleschi, who designed the cupola. The cathedral is in length 500 ft., the transept 306 ft.; the nave is 153 ft. high, the side aisles 96 ft. 6 in. The cupola is octagonal in form, 138 ft. 6 in. in diameter, and in height from cornice of the drum to the eye of the dome 133 ft. 6 in. Michel Angelo used this dome as a model for that of St. Peter's. The interior of the duomo is rather dark, the windows being small and the glass darkly stained. The pavement is tessellated in red, blue, and white marble. The frescoes in the cupola are from designs by Vasari. The entire edifice covers 84,802 sq. ft.—The cathedral at Cologne, begun about the middle of the 13th century, is one of the most imposing Gothic structures in Europe. The original architect is unknown. The choir was not consecrated till 1322, and the north and south aisles of the

nave had only been carried up to the capitals of the columns in 1509, and were covered with a wooden roof. Work was suspended till 1830. In 1842 Frederick William IV. laid the first stone of the transept, which with the north and south portals was finished before 1863, when the whole interior was thrown open. The length of the cathedral is 511 ft., breadth 231 ft., and the towers will be 511 ft. high. Externally it has a double range of flying buttresses and intervening piers, and a perfect forest of pinnacles.—The cathedral of Dantzic was begun in 1343 and finished in 1503. It is of brick, and 358 ft. long. The vaulted roof is 98 ft. high, supported by 26 slender brick pillars. Around the interior are 50 chapels founded by citizens of the place as family burial places. The great ornament of this building is a painting of the "Last Judgment," attributed to Jan van Eyck. According to tradition, it was painted for the pope, but on its way from Bruges to Rome was captured by pirates. Being retaken by a Dantzic vessel, it was deposited in the cathedral in 1467.—The cathedral of Notre Dame in Antwerp is one of the largest and most beautiful Gothic buildings in the Netherlands. It was commenced between 1352 and 1411. The west front and tower are of the 15th century. It is 390 ft. long and 250 ft. wide. In 1566 it was sacked and much injured. It contains the celebrated masterpiece of Rubens, the "Descent from the Cross."—The cathedral at Rheims was commenced in 1211 and the choir dedicated in 1241. It was completed in 1430, and is 466 ft. long. The cathedral at Amiens was begun in 1220; it is 469 ft. long, and has a central spire 422 ft. high, which dates however only from the 16th century.—The cathedral at Strasburg, one of the grandest Gothic churches in Europe, is remarkable for its spire, designed by Erwin of Steinbach. The work was half finished in 1318, when he died, and was continued by his son and afterward by his daughter Sabina. It rises 468 ft., and is an open fretwork of stone bound together by iron ties. The tower was completed in 1439, but a second tower, which the cathedral was intended to have, is still unfinished, and mars somewhat the effect. During the siege of the city by the Germans in 1870 it was badly injured by shells and other projectiles.—The cathedral of Notre Dame in Paris stands upon the spot once occupied by a Roman temple. It is said that a church dedicated to St. Stephen was erected on the same site about 365, in the time of Valentinian I., and was enlarged in 522 by Childebert, son of Clovis. Robert, son of Hugh Capet, undertook to rebuild this church, which was called Notre Dame from a chapel which Childebert had dedicated to the Virgin. But this church was never finished and fell into ruins. The first stone of the present edifice was laid about 1163, by Pope Alexander III., Maurice de Saliac being bishop of the diocese. The high altar was consecrated in 1182 by Henry, legate

of the holy see, and in 1185 Heraclitus, patriarch of Jerusalem, officiated in the church. The west front was finished by Maurice de Sully, the bishop, in 1223. The southern transept with its portal was completed in 1257, and the northern transept and portal in 1312 by Philip the Fair. The western doors with their iron work were made about 1570-'80 by Biscourette. The dimensions are as follows: length 390 ft., width of transept 144 ft., height of vaulting 105 ft., height of western towers 224 ft., width of front 128 ft., length of nave to transept 186 ft. The pillars of the nave are 4 ft. in diameter, resting on gravelled beds 18 ft. below the surface. The style of architecture is pure pointed. The nave and side aisles are paved with marble; the aisles around the choir are paved with stone and black marble. An immense vault, extending the entire length of the nave, was constructed in 1666 for the interment of chaplains, &c. The organ is 45 ft. high, 36 ft. wide, and has 3,484 pipes. The interior of Notre Dame is not so rich in decorations as the exterior. The arches of the nave are pointed; the piers are circular pillars, with large and well formed capitals. The pillars of the aisles are alternately circular and clustered. The cathedral covers 64,108 sq. ft. —England has many cathedrals worthy of particular mention. That at Salisbury is the most perfect and beautiful specimen. It was founded by Bishop Richard Poore in the year 1220, in the reign of Henry III., and was finished in 1260. Its plan is a double cross, in extreme length 442 ft., length of greater transept 203 ft. The cathedral at Canterbury dates from shortly after the Norman conquest. It was built on the site of an earlier cathedral, and modelled after that of St. Stephen at Caen, from which plan subsequent alterations have deviated. It has three towers, one in the centre and two at the west end. The northwestern tower, of Norman date, was replaced by a new one in 1832. The centre tower, which is 235 ft. in height, was begun toward the end of the 15th century. The cathedral is 574 ft. long and the greater transept 159 ft. The crypts, which extend under the entire building, are the finest in England. The interior of the eastern part, known as Becket's corona, had but recently been finished when the cathedral was partly destroyed by fire in 1872. Ely cathedral is 517 ft. in length and 190 in breadth, and has a nave 203 ft. long, 81 wide, and 74 high. The style of the building externally is Norman and early English. The centre tower and lantern, 270 ft. high, supported on eight large piers, is a remarkable feature. Lincoln cathedral is one of the most perfect examples of the early English style. It is 524 ft. long outside, and 482 inside. The greater transept is 250 ft. long outside by 222 inside. The chief tower is 300 ft. high. The cathedral at York is irregular in plan, and its parts are of different date, yet its aspect is imposing from its grand dimensions. It is 524 ft. long, 222 wide, and has

a superb centre tower. The nave, from door to choir, is 264 ft. long, and is 106 ft. wide and 93 high. It has a small crypt, a consistory court, and an elegant octangular chapter house, which leads from the north transept. St. Paul's, London, was commenced in 1675, Sir Christopher Wren being the architect, and was finished in 1710. It is built of fine Portland stone, in the form of a Latin cross, its length being 500 ft., the transept 285 ft. long, and the west front 180 ft. wide. The campanile towers at the west front are each 222 ft. high. The dome is 365 ft. from the ground, and 356 from the floor of the church, and it is 145 ft. in diameter. Simple ratios exist between the principal dimensions. The windows are mainly 12 ft. wide by 24 high, the aisles 19 ft. clear width by 38 in height; the central avenue is 41 by 84 ft.; the domed vestibule at the west end is 47 ft. square by 94 ft. high. The architectural elevation has two orders, the lower being Corinthian and the upper composite. The interior lacks in ornament, disappointing one who has seen the cathedrals on the continent. A still graver defect is the darkness under the dome, the light being scantily admitted and not well distributed. It was begun and finished under one architect, with a few mean exceptions. The organ was built in 1694 by Bernard Smydt. St. Paul's is the fifth in size of the great churches of Europe, being smaller than St. Peter's and the cathedrals of Florence, Milan, and Amiens. —In America, the cathedral of St. Peter and St. Paul at Philadelphia was commenced from designs by Le Brun in September, 1846, and opened for worship in 1862. It is built of red stone after the style of the modern Roman cruciform churches. The dome is 210 ft. in height. It has a fine organ, frescoes, and an altarpiece by Brumidi. At Baltimore the Catholic cathedral is built of granite, and is 190 ft. long, 177 ft. broad, and 127 ft. high from the floor to the top of the cross which surmounts the dome. It has a large organ of 6,000 pipes and 36 stops, a painting presented by Louis XVI., and one the gift of Charles X. of France. St. Patrick's cathedral, New York, now building (1873), was projected by Archbishop Hughes, who laid the corner stone, Aug. 15, 1858. The material is a brilliant micaceous marble, which is especially well adapted to the decorated Gothic style of architecture chosen for the work. It is 332 ft. in length and 132 ft. in general width, with an extreme width at the transepts of 174 ft. There will be two towers 328 ft. high. The cathedral of Notre Dame in Montreal is 255 ft. long and 135 broad, and is capable of seating 10,000 persons. It has two towers, each 220 ft. high, one of which contains a chime of bells and the other a single bell, the *Gros Bourdon*, weighing 29,400 lbs. There are cathedrals, some of them of imposing architecture, in several cities of southern America. That in Mexico, begun in 1573, completed in 1667, is built in an irregular mixture of the Gothic and Italian styles, and is

500 ft. in length and 420 in breadth. That of Lima is a massive stone structure, 320 ft. long and 180 wide, the façade painted red and yellow, with lath and plaster towers at each angle.—Notices and illustrations of the principal cathedrals throughout the world will be found under the names of their respective places.—See "Essays on Cathedrals," edited by J. S. Howson (London, 1872).

CATHELINEAU, Jacques, generalissimo of the Vendéans in the revolt of 1793 against the revolutionary government of France, born at Pin-en-Mauges, in Anjou, Jan. 5, 1759, died at St. Florent, July 11, 1793. After having been engaged in the business of his father, who was a mason, he became a linen peddler, and after the outbreak of the French revolution was poor, with a large family. His religious devotion was so well known in the province, that he was called the saint of Anjou. A bloody fight that took place at St. Florent, March 12, 1793, between the republican troops and the royalists, on the occasion of a levy for the army according to a recent decree of the convention, roused the spirit of Cathelineau, and at the head of a body of youth he attacked and expelled the garrisons of Jallais and Chollet. As the number and courage of his bands, though without regular arms, were continually increasing, he fought several engagements, mostly with success. After the taking of Saumur, June 13, he was elevated to the dignity of general-in-chief, as the most popular of the leaders. He marched against Angers, which made no resistance; but an attack on Nantes ended, after a whole day of desperate struggle (June 29), in the dispersion of his troops. Cathelineau was wounded and carried to St. Florent, where he died after 12 days. After the restoration of the Bourbons his surviving children were rewarded with pensions, and his statue was erected at his birthplace, but was broken in 1832 by soldiers of Louis Philippe.—His son Jacques, born March 28, 1787, took part in an anti-Napoleonic movement in La Vendée in 1815, and was shot in 1832 while engaged in the conspiracy of the duchess of Berry.

CATHERINA ARCHIPELAGO. See supplement.

CATHOLIC CHURCH. See ROMAN CATHOLIC CHURCH.

CATILINE, or *Catilina*, **Lucius Sergius**, a Roman conspirator, killed in the engagement of Fæsulæ, 62 B. C. He was the descendant of an ancient but decayed patrician family, and is said by his enemies to have spent his youth and early manhood in a career of profligacy and crime, taking a bloody part in the proscriptions of Sulla, when even some of his own relations became his victims. He was suspected of criminal intercourse with a vestal, and believed guilty of the secret murder of his first wife and his son, committed in order to marry another woman. All this did not prevent him from obtaining important offices and aspiring to the highest dignities in the republic, being able by his mental and bodily powers,

of which even his enemies speak with admiration, to undertake every task. Having been sent as prætor to Africa, he returned in 66 B. C. to Rome, to become a candidate in the next consular election, but was disqualified by a charge of extortion in his province, directed against him by Clodius Pulcher, known by his later enmity to Cicero. The newly elected consuls were convicted of bribery, and Cotta and Torquatus, their accusers and competitors, took their places. On these Catiline resolved to wreak his vengeance, conspiring against their lives with Autronius, one of the deposed consuls, Cn. Piso, and others. The first day of the consulship was fixed for the assassination, but Catiline, it is said, frustrated the attempt by his impatient haste in giving the signal. This failure only stimulated him to greater undertakings. He now, it is alleged, formed a new conspiracy with the purpose of exterminating the whole body of the senate, murdering all the magistrates of the republic, and sharing its sway and treasures with his followers. Such is the representation of great contemporary writers, though their impartiality may be questioned. The corruption of the times favored his designs; ruined nobles of all ranks, profligates, and intriguing persons of both sexes, joined him; many veterans of Sulla were found ready to renew the familiar scenes of proscription; the restless populace could easily be used. His chief coöperators were P. C. Lentulus and P. Autronius, ex-consuls, L. Calpurnius Bestia, tribune elect, Cethegus, two nephews of Sulla, and others. It was now his interest to be elected consul; he became a candidate, but was again unsuccessful. Cicero was elected with C. Antonius. Catiline now pushed on with greater vigor. The plot was matured; troops were levied, especially under C. Manlius, a centurion of Sulla, in the vicinity of Fæsulæ, in Etruria; arms were provided, the lists of proscription made out, and the day fixed for the assassination of the consuls and the general conflagration of the city. The watchfulness of Cicero saved himself and the republic. Fulvia, the mistress of one of the conspirators, was induced to communicate all the particulars; C. Antonius was made harmless by the promise of Macedonia as a province. Informed by Cicero, the senate intrusted the consuls with absolute power to save the republic from the threatening danger. At the following consular election Catiline was again rejected, and in the night of Nov. 6, 63, he declared in a secret meeting to his ringleaders that the time of action had arrived. Cicero, who knew their every movement, summoned the senate, and delivered his first great oration against Catiline, giving full and ample information of all the facts. Catiline was bold enough to be present and to attempt his justification; but his voice was drowned by the cries of "Enemy" and "Paricide" from the indignant senators, and he was left on his deserted bench a spectacle to the assembly. He left Rome in

the following night to join the camp of Manlius, leaving the management of affairs at the capital to Lentulus and Cethegus. Cicero now addressed the people in the forum, justifying his conduct; the senate declared Catiline and Manlius enemies of the republic, while legal evidence against the conspirators at Rome was furnished by the communications of the ambassadors of the Allobroges, who, being sent to Rome for the redress of grievances, were tempted by Lentulus to join the conspiracy, and to induce their nation to assist in it. Cicero, who received the information from their patron, persuaded them to feign an active participation, and to draw from Lentulus a list of the conspirators, as if by it to induce their countrymen to join in the enterprise. Lentulus and his friends fell into the snare. They were now brought before the senate, assembled in the temple of Concord (Dec. 4), and their guilt was proved. Having delivered his third oration before the people, Cicero on the next day again convoked the senate to deliberate on the punishment of the traitors. The debate was animated. Silanus, the consul elect, gave his opinion for the immediate death of all of them; this was opposed by Julius Cæsar, who was satisfied with their arrest and the confiscation of their estates, and who indeed has been suspected by historians of having been connected with the plot. Cicero gave no opinion, but painted in strong terms the dangers of the state. Cato, voting for death and for immediate efforts against the rebels in the field, made an appeal to the patriotism of the senate, and prevailed. A decree was passed, and Lentulus and his companions were strangled in the night in prison, in direct violation of Roman law. An army was sent against Catiline under the consul Antonius; but, unwilling to fight against his friend, he gave the command to his legate Petreius. They met near Fæsulæ. Catiline defended himself desperately, but in vain; when the battle was lost he threw himself into the midst of his enemies, and fell fighting.—Salust's masterly life of Catiline is our chief authority for his history, but is too obviously the work of a partisan to be implicitly trusted. Catiline was the leader of the ultra democratic party, and the supporters of the optimates who overthrew him may be suspected of having exaggerated his faults and misrepresented his designs.

CATINAT DE LA FAUCONNERIE, Nicolas de, a French general, born in Paris, Sept. 1, 1637, died Feb. 25, 1712. He entered the army as an ensign, and at the siege of Lille in 1667 so conducted himself as to attract the notice of Louis XIV. His subsequent exploits obtained for him in 1688 the rank of lieutenant general, and in 1693, after he had conquered the greatest part of Savoy, he received the marshal's staff. In 1701 he commanded the army in Italy against Prince Eugene; but failing to arrest the progress of the prince, Villeroi was appointed to his place. Catinat served

under him, and in attacking the intrenchments at Chiari he was repulsed and wounded. He commanded in Germany for a short time, and spent the rest of his life at his estate of St. Gratien, near St. Denis.

CATINEAU-LAROCHE, Pierre Marie Sébastien, a French lexicographer, born at Saint-Brieuc, March 25, 1772, died May 22, 1828. He studied at Poitiers, and in 1791 emigrated to St. Domingo, where he published at Port-au-Prince a journal, *L'ami de la paix et de l'union*. He gave such offence to the colonists by his anti-slavery sentiments that he was prosecuted, and would have been sentenced to death by the local tribunals but for the interference of the agent of the home government. He went to Cape Haytien (then called Cap Français), where he alone of 17 of his countrymen was saved from the massacre which broke out in that city. He then visited the United States and England, and on his return to Paris in 1797 established a printing office and composed several dictionaries. His printing office having been destroyed by fire, the government employed him, and in 1819 he was sent to study the climate and resources of Guiana. His notes on that country appeared in 1822.

CATLIN, George, an American artist, born at Wilkesbarre, Penn., in 1796, died in Jersey City, N. J., Dec. 23, 1872. He studied law in Connecticut, and practised there for two years. Afterward he devoted himself to painting in Philadelphia, without any previous instruction. Some Sioux Indians arriving on a delegation in the city, he was struck with their appearance, and determined to visit their homes. He started from St. Louis in 1832, in a steamer called the *Yellowstone*, being greatly assisted by Pierre Chouteau, one of the owners of the boat. After a passage of three months he reached the mouth of the Yellowstone river, where he was left. He visited during the next eight years about 48 tribes, numbering in the aggregate 400,000 souls, and collected much information concerning their habits and character. He returned to the east by the way of the Indian territory, Arkansas, and Florida, and after finishing his Indian portraits and scenes sailed for Europe in 1840. In 1841 he published in London "Illustrations of the Manners, Customs, and Condition of the North American Indians," containing 300 steel engravings (2 vols. 8vo); in 1844, a portfolio of hunting scenes in the west containing 25 plates; in 1848, notes of his eight years' travels in Europe with his collection of paintings; in 1864, a curious volume called "The Breath of Life, or Shut your Mouth," showing the hygienic importance of exclusive breathing through the nostrils. After several visits to and long residence in Europe, exhibiting and endeavoring to sell his Indian gallery, he returned to the United States in 1871, where he remained until his death.

CATMANDOO. See KATMANDU.

CATNIP, or *Catmint*, the leaves of a perennial herbaceous plant, *nepeta cataria*, of the family

labiate, which is very common in the fields throughout the United States, though supposed to have been introduced from Europe. The plant possesses medicinal virtues, so that it is



Catnip (*Nepeta cataria*).

recognized in the pharmacopœias, and is employed as a domestic remedy, but rarely in regular practice. The leaves, which alone are used, are aromatic and somewhat bitter and pungent to the taste, and of disagreeable odor; cats eat them with great relish. Catnip is administered in infusion. It acts as a tonic and excitant, and possibly as an antispasmodic and emmenagogue, being frequently given with reference to such supposed qualities.

CATO, a surname, signifying the Wise, first given to the Roman Marcus Porcius, known in history as Cato the Censor, and afterward borne by that family of the (plebeian) Porcian gens of which he was the first famous member. **I. Marcus Porcius**, afterward called **PRISCUS**, and surnamed **CATO** and **CENSORIUS**, a Roman statesman and patriot, born at Tusculum, probably in 234 B. C., died in Rome in 149. His father, the descendant of a family for many generations resident in Latium, died when he was very young, and left him a small estate at a considerable distance from his birthplace, in the territory of the Sabines. Here he spent his early youth in work upon his land, leading a simple life, and studying such subjects as he thought would best advance the career of patriotic service which he had already marked out for himself. When 17 years of age, in 217, he entered the Roman army, and served in the campaign of that year against Hannibal. In 214 he served at Capua, and in 209 he was with Fabius Maximus at Tarentum. During the short periods between his various terms of service he devoted his time to labor on his farm. Near this favorite resort a Roman patrician, Lucius Valerius Flaccus, had a large estate. Cato was constantly brought into contact with

him, and impressed the noble so favorably that the latter begged him to go to Rome with him, and under his patronage, as the custom was, to study law and oratory. Cato consented, and made his entry into the Roman political world with marked success, rapidly acquiring celebrity as a pleader and orator in the forum, and becoming a candidate for the quaestorship, an office which he attained in 205. In this capacity he accompanied Scipio Africanus to Sicily in 204, but went back to Rome before the return of his general, whom he accused to the senate of prodigality and mismanagement. This is the story given by some authorities, though Livy says the inhabitants of Locri were the complainants against Scipio, and does not mention Cato by name as having pleaded their cause. A commission of investigation was the result of the complaint, and Scipio was acquitted. Concerning the next few years of Cato's life we have slight details, but know that he was ædile in 199, and that in 198 he was made prætor, and received the province of Sardinia. Here he showed in his administration and mode of life the economy, simplicity, and impartial justice which distinguished his whole career. By the frugality of his habits, by his example in public, and his prompt punishment of venality and corrupt practices, he endeavored to combat the introduction of habits of luxury and extravagance from Greece, and to restore the old severity and strength of the Roman character. In 195 he was chosen consul, Lucius Valerius Flaccus, his former patron, being his colleague. It was then customary for one of the consuls to take the governorship of a distant portion of the Roman possessions, and Cato was assigned to that of Hither Spain, a province then in a state of revolt and great disorder. Here he showed remarkable ability as a military leader, suppressed the rebellion, compelled the Spanish cities to destroy the greater part of their fortifications, and restored affairs to their old condition. On his return to Rome in 194 he received the honor of a triumph. In the consulship of Manius Acilius Glabrio, which immediately followed his own, Cato accompanied that officer as legate in his campaign against Antiochus in Greece. Here, by a sudden and remarkably difficult march, he decided the principal battle of the war in favor of the Romans, and compelled the retreat of the enemy. Returning to Rome, he from this time abandoned military life, and resumed his place as a popular orator in the forum and the courts. In 184 he was made censor, again having his old friend Flaccus as his colleague. In the exercise of the censorship Cato gained the most enduring fame of his life. He was now in a position to powerfully oppose the growing corruption, luxury, and immorality at Rome, and to do more than ever toward restoring his old ideals of simplicity and severity of manners. He raised the taxes on luxuries of many kinds, degraded officers for the most trifling acts of levity as well as

for actual crimes, and bitterly persecuted those who opposed his acts. He improved the public works of the city, while introducing economy in the contracts, and stopped many abuses of the privileges of the citizens. Now, as during his whole life, he was warmly on the side of the plebeians, and opposed the nobles by every means given him either by his official or personal influence; so that his censorship was a constant struggle with the patricians, both in petty and important matters. In revenge they began against him several prosecutions, but he defended himself successfully in every case from their charges of maladministration. At the close of his censorship the people caused his statue to be erected and a commemorative inscription to be placed upon its pedestal. Cato now ceased to hold public office, except as a senator, but continued a remarkable activity in political affairs, never relaxing in his opposition to all forms of luxury, and attacking bitterly the vices of the nobles. He was employed in several important cases: in the prosecution of M. Matienus and Publius Furius Philus for maladministration in Spain (171); in the defence of the Rhodians from the charge of treachery toward Rome; and in others of equal moment. He took a leading part in the debates of the senate on all great questions, always favoring a policy intensely hostile to foreigners; his hostility toward all outside nationalities is shown in many familiar anecdotes. The patricians continued to manifest their hatred of him, and as late as 153, when he was 81 years old, Caius Cassius brought against him a serious accusation, the nature of which is not recorded, which compelled him to defend himself, with ultimate success. In 150 he began in the senate to urge an immediate declaration of war against Carthage (the third Punic war). With nine other deputies he was sent in that year to investigate the condition of the rival city, and was so impressed by its appearance of power and prosperity that he declared on his return that Rome could no longer permit so powerful an enemy to exist. His hatred of Carthage now became the absorbing passion of his life; he urged upon the people the importance of war, and never rose to speak or give his vote in the senate without adding to whatever else he said, no matter how foreign was the subject, *Ceterum censeo, Carthaginem esse delendam* ("I vote, moreover, that Carthage must be destroyed")—a sentiment more familiar in the form *Delenda est Carthago*, which Cato himself probably never used in formal debates. A part of the last year of his life was spent in aiding the prosecution of S. Sulpicius Galba for treachery; but this, though undoubtedly just, was unsuccessful. Soon after its conclusion Cato died, at the age of 85.—The character of Cato was bitter and severe; in private life, and especially in the treatment of inferiors and slaves, he exhibited the greatest harshness. His personal morality, tried by a modern standard, was in some respects not so

pure as it has been often represented by partial historians. After the death of his first wife Licinia he for a long time cohabited secretly with a female slave, and only married again, when nearly 80, on his son's discovery of his concealed course. But his honesty and patriotism were incorruptible at a time when those around him possessed little of either virtue. His energy was extraordinary, and his frugality, temperance, and simplicity were like those of the early patriots whom he endeavored to imitate. Though opposed to the influence of Greek literature, the principal source of refining education in his time, he possessed considerable culture and literary skill, and left an essay on agriculture (*De Re Rustica*), still extant, and the *Origines*, only fragments of which remain, besides less important works of which we also have a few portions. A collection of these was published in Leipsic, by Jordan, in 1860.—Cato left two sons; one, M. Porcius Cato Licinianus, afterward became a jurist of eminence; the other, M. Porcius Cato Saloni-anus, by his second wife Salonia, was born in his father's 80th year, and lived to become prætor. **II. Marcus Porcius**, surnamed **UTICENSIS** from the place of his death, a Roman statesman, philosopher, and general, great-grandson of the preceding, born in Rome in 95 B. C., died by his own hand at Utica in 46. Having lost his parents when he was very young, he was brought up and educated by his maternal uncle, Marcus Livius Drusus, and after the death of the latter by Sarpedon. As a boy and young man he was conspicuous for his gravity, firmness, and bravery when his anger was aroused. Going with Sarpedon upon one occasion to visit Sulla, and seeing the heads of several famous Romans, victims of the proscription, carried from the tyrant's house, it is said that young Cato asked why no one put an end to the despot; and on being told that none dare do so, he demanded a sword of Sarpedon, that he himself might free his country. Although he received an ample fortune from his father's estate, he imitated his ancestor the Censor in his extreme frugality and simplicity, opposing luxury, practising rigid economy, and strengthening his body by every form of difficult exercise and exposure. In the corrupt state of Rome in his time, he thus acquired a not undeserved popularity as the advocate of purer customs, and a reputation for moral rectitude such as had formerly distinguished the elder Cato. His first military experience was gained, in 72 B. C., as a volunteer under Gellius Publicola in the war with Spartacus, but he did nothing noteworthy in this earliest campaign. In 67 he became a candidate for the office of military tribune, and was elected in spite of his neglecting the ordinary corrupt means taken to gain the post. With his legion he was stationed in Macedonia, under the proprætor Marcus Rubrius. He was exceedingly popular with his command, and lived with the simplicity of a common soldier among

them, always sharing their hardships and difficulties. In his youth he had begun the study of philosophy, and had become a disciple of the Stoics. He continued the practice of their doctrines and the study of their works, and while stationed in Macedonia obtained a leave of absence that he might visit the philosopher Athenodorus Cordylion at Pergamus, whom he persuaded to go back with him when he returned to his legion. At this time Cato lost his brother, Servilius Cæpio, to whom he was warmly attached. Hearing of his having an attack of illness at a Thracian town, Cato hurried to meet him, but did not arrive in time to see him alive. He was overcome with grief, and, after celebrating Cæpio's funeral with great splendor, set sail for Rome on the ship bearing his brother's ashes. After several years of study in Rome, where Athenodorus was still his companion, he was elected quæstor in 65, and so distinguished his administration of the office by honesty, economy, and rigid justice, that he left it at the expiration of his term with his popularity greatly increased. A journey to Asia, as to the date of which authorities disagree, probably took place about this time. He visited King Deiotarus of Galatia, who received him with many marks of respect, but offered him presents, which so disgusted Cato that he pursued his journey the day after his arrival. Pompey, then in the East, also received him with respect, but without cordiality. In 63 Cato was elected tribune, consenting to be a candidate after having once refused, in order to defeat certain plans of Pompey, who was already plotting for the control of the state. In the same year, and in the consulship of Cicero, the Catilinarian conspiracy occurred. Cato voted for the death of the conspirators, and conferred on Cicero the title of *pater patriæ*. The great conflict for power between Cæsar and Pompey was now beginning. Cato, with the purest patriotism, not only opposed them both by every means in his power, but constantly warned the people of the danger of the state's falling under the control of any one man. His patriotism, however, was greater than his political ability, and he was easily outgeneralled by Cæsar, who in spite of his opposition carried almost every end he had in view. Cæsar, Pompey, and Crassus, to finally rid themselves of his interference with their plans, determined to send him against Ptolemy, king of Cyprus, although no possible cause for war existed, and to annex the island to the Roman possessions. Cato sent a message to Ptolemy telling him of the determination; and Ptolemy, rather than oppose Rome, poisoned himself, leaving Cato to take peaceful possession of his kingdom. This he did, returning to Rome in 56. In the next year he opposed the election of Pompey and Crassus to the consulship, but without success. He was exposed to great danger in the election riots, and was even wounded. In 55 also he was defeated in the election for prætor, in

great part because he refused to employ bribery to gain the office. During the next year he was again a candidate, and this time he was elected. As prætor he devoted himself to the suppression of the prevailing corruption, and made himself so unpopular by his severe prosecutions for bribery that he was even attacked in the streets by a mob, which he with difficulty succeeded in quieting. In 52 he supported the proposition to make Pompey sole consul; but repenting the next year of his share in giving him power, he himself became a candidate for the consulship, only to be defeated by two rivals, in the interest of Pompey and Cæsar. In 49, when the civil war began, and Cæsar approached the city with his army, Cato, after resisting by every means in his power the plans of the great leader, left Rome with the consuls, and went to Campania, where for some time he seemed to completely despair of the preservation of the state. He was soon, however, intrusted with the defence of Sicily, but abandoned it on the approach of Cæsar's army, and hurried to Pompey's camp at Dyrrhachium. He was left in charge of this during the battle of Pharsalia (48), but on Cæsar's victory he again withdrew his troops, and set sail with them for Coreyra, whence he continued his journey to Africa, to join Pompey. But he did not arrive until after Pompey's assassination, and took refuge in Cyrene, the inhabitants of which consented to admit him with his command. In 47 he again marched out of the city, and across the desert, to join Q. Metellus Scipio, to whom he yielded the command of his troops, advising him, however, not to risk an immediate engagement. Scipio persisted in doing so, and was defeated at Thapsus in April, 46. Utica alone, of all the African towns, held out against Cæsar; and even its inhabitants could not be persuaded by Cato longer to resist the conqueror. Cato had now no refuge; but he exhibited the greatest calmness. He made arrangements for the flight of his friends from the city, and for giving them an opportunity to make terms with Cæsar; but he himself remained behind, and resolved to die by his own hand rather than fall into the power of the enemy. He spent the last day of his life in pleasant intercourse with those about him, and at night retired early to his room, where he for a long time lay upon his bed reading Plato's "Phædo." Then, drawing his sword, he stabbed himself, and fell to the floor, the noise arousing his friends, who hastened to bandage his wound. But he tore the bandages away, and almost immediately expired. The people of Utica buried him with every honor, and erected a statue to his memory. Cæsar is said to have cried out, on hearing of his suicide, "Cato, I begrudge thee thy death, since thou hast begrudged me the glory of sparing thy life." As a man and a statesman Cato was pure, sincere, and conscientious to a degree most remarkable in his time; he had not the

harshness of his ancestor the Censor, yet he possessed unusual firmness. In politics, however, he had little skill, and his expedients to defeat his opponents, though never corrupt, were almost always clumsy and ill-advised. As a general he exhibited little ability.—He was twice married: first to Attilia, a daughter of Serranus, who bore him two children, but was divorced for adultery; second to Marcia, by whom he had three children. Singularly enough, he is recorded to have lent or yielded his second wife to his friend Quintus Hortensius, about 56 B. C., with her father's consent; taking her back after his friend's death, and living with her as before.

CATOOSA, a N. W. county of Georgia, bordering on Tennessee, and watered by affluents of the Tennessee river; area, 175 sq. m.; pop. in 1870, 4,409, of whom 616 were colored. It is traversed by the Western and Atlantic railroad. The surface is hilly and partly covered with forests. The chief productions in 1870 were 43,366 bushels of wheat, 90,855 of Indian corn, 19,909 of oats, 40,879 lbs. of butter, and 96 bales of cotton. There were 542 horses, 834 milch cows, 1,225 other cattle, 2,447 sheep, and 4,399 swine. Capital, Ringgold.

CATRON, John, an American jurist, born in Wythe co., Va., in 1778, died in Nashville, Tenn., May 30, 1865. He received a common school education, removed to Tennessee in 1812, studied law, and was admitted to the bar in 1815. In the New Orleans campaign he served in the army under Jackson, and was afterward elected state's attorney. He settled in Nashville in 1818, and was one of the supreme judges of Tennessee from 1824 to 1836. In 1837 President Jackson appointed him associate justice of the United States supreme court. He opposed secession, and was consequently obliged to leave the state. His decisions on the state bank are contained in "Yerger's Tennessee Reports," and his federal decisions in the later volumes of Peters, the 20 vols. of Howard, and the 2 vols. of Black.

CATS, Jakob, a Dutch statesman and poet, born at Brouwershaven in Zeeland, Nov. 10, 1577, died at Zorgvliet, near the Hague, Sept. 12, 1660. He studied law at Leyden, Orleans, and Paris, and on his return to his native land practised his profession for a while, and also published some successful poems. In 1627 he was ambassador to England, from 1636 to 1651 grand pensioner of Holland, and in 1652 again ambassador to England. He wrote a poem entitled "Country Life" (*Buitenleven*), and numerous "Moral Emblems," fables, and songs. A new edition of his works, in 19 vols., appeared in Amsterdam in 1790-1800. A German translation of part of them was published at Hamburg in 1710-17. His "Emblems" have been translated into English. A monument was dedicated to him at Ghent in 1829.

CAT'S EYE, a semi-transparent variety of quartz penetrated by fibres of asbestos. It is commonly of a greenish gray color, though

sometimes yellow, red, or brown. When polished, it reflects a pearly light resembling the pupil in the eye of a cat.

CATSKILL, a village and the capital of Greene co., New York, situated on the W. side of the Hudson river, about 110 m. above New York; pop. in 1870, 3,791. There are several churches, a court house, jail, and some manufactories. It is the landing place for visitors to the Catskill mountains, and a ferry here crosses the Hudson, connecting with the railroad on the eastern bank.

CATSKILL MOUNTAINS, a group of the Appalachian chain, on the W. side of the Hudson river, lying mostly in Greene co., N. Y. Their E. base is 7 or 8 m. distant from the village of Catskill. These mountains range parallel with the river only for about 12 m., spurs from their N. and S. terminations turning respectively N. W. and W., and giving to the group a very different form from that of the parallel ranges of the Appalachians, as seen in Pennsylvania. It differs from these also in assuming more of the Alpine character of peaks considerably elevated above the general summits. It resembles them in the precipitous slopes toward the east, and the gentler declivities, which are lost in the high lands on the W. side. Its geological structure is almost a repetition of that of the main Alleghany ridge throughout Pennsylvania, the same formations succeeding in the same order from the E. base to the summit, and giving to it, even in a more marked degree than is there witnessed, the terraced outline due to the alternation of groups of strata, some of which are easily worn away, and others powerfully resist denuding forces. Along its E. base the strata of the old red sandstone formation are seen dipping in toward the central axis. These are succeeded by the gray slaty sandstones of hard texture, which make up the most precipitous slopes, except those of the highest summits, which are capped by the conglomerate of white quartz pebbles. This is the floor of the coal formation. Upon the Alleghany mountain it forms the highest knobs, which present their vertical fronts to the east and slope away to the west. The dip in this direction being there steeper than the declivity of the mountain, the coal beds find a place above the conglomerate; but upon the high peaks of the Catskills this rock lies too horizontally for higher strata to appear, and a descent to lower levels in a W. direction only brings to view again the same formations met with on the E. side. Thus, for want of 100 ft. perhaps of greater elevation, the Catskills miss the lowest coal beds. Even in the midst of the strata of the conglomerate its carboniferous character is seen by the black shales here and there pinched among its massive blocks, and by seams of anthracite of a few inches in thickness contorted into strange forms. These, before their real relations were understood, led to futile explorations to discover workable beds of coal in the hard sandstones of these sum-

mits. But it is now well understood that the Catskills can never claim regard for the value of their mineral productions. Their chief interest lies in the variety and beauty of their scenery. In a field of very limited area, easy of access and soon explored, they present a multitude of picturesque objects, which have long made them a favorite resort of artists and of those who find pleasure in the wild haunts of the mountains. From the village of Catskill a stage road of 12 m. leads to the "Mountain House," a conspicuous hotel, perched upon one of the terraces of Pine Orchard mountain, at an elevation of 2,500 ft. above the river. Here the traveller finds a cool and quiet retreat, and a convenient starting point for his explorations. A hotel has recently been erected on the summit of "Overlook" mountain, a few miles south of the Mountain house, at a height, it is asserted, of 3,800 ft. It is accessible from Rondout. From these hotels are obtained extensive views of the fine country around, of the Hudson river, visible with all the towns upon its banks from the Highlands to Albany, and of the mountains of Vermont, Massachusetts, and Connecticut. The most striking features of the Catskills are the cascades of the mountain streams, and the deep gorges or "cloves" through which these find their way to the lower lands. The highest summits are Round Top, High Peak, and Overlook, the elevation of which, according to barometrical measurements, is about 3,800 ft. The clove of the Catterskill, or Kaaterskill, which commences a mile W. of two small lakes, lies between these and Round Top, the latter being on the S. and the lakes on the N. side. High Peak is 6 m. distant from the head of the clove, and is reached by a foot path. The clove is a ravine of 5 m. in length. At its head the rivulet from the lakes meets another branch from the north, and their united waters flow with increasing swiftness to a point where the mountain divides like the cleft foot of a deer, leaving a deep hollow for the brook to tumble into. The descent of the first cascade is 180 ft., that of the second 80, and below these there is another fall of 40 ft. In the winter the upper fall becomes encased in a hollow column of blue ice, which reflects in the rays of the sun the brilliant colors of the prism. Below the falls the sides of the gorge rise in a succession of walls of rock to the height of 300 ft. or more. Other falls are met with by following the stream down toward the Hudson, till 2 m. above the village of Catskill the waters are discharged into the stream of this name. The Stony clove is 6 m. W. from the head of the Catterskill, in a portion of the group called the Shandaken mountains; it is only $1\frac{1}{2}$ m. long. The clove of the Plattekill is 5 m. S., beyond the Round Top and High Peak; its scenery possesses the same wild character as the Catterskill. Numerous side streams descend the steep mountain on its S. side from an altitude of 2,000 ft., leaping from ledge to ledge

till they mingle their waters with the Plattekill. Where the stream first falls into the clove it is said to descend in successive falls 1,000 ft. in a few hundred yards; and, as stated



Catterskill Falls.

by others, 2,500 in 2 m. The streams which flow down the E. slopes of the mountains soon find their way into the Hudson. On the W. side the drainage is into the Schohariekill, which runs northward and falls into the Mohawk 50 m. above its junction with the Hudson. The forest growth near the foot of the mountains is black and white oak, interspersed with hickory, chestnut, butternut, and several species of pine. Cedars and swamp ash are found in the swamps. The hard-wood growth of maple, beech, and birch is met with upon the better soils up the mountain sides, while hemlock, spruce, and the balsam fir occupy the more barren and rocky places. The valleys beyond the E. ridge contain forests of hemlock, with beech, birch, and wild cherry trees intermixed.

CATTARAUGUS, a S. W. county of New York, bordering on Pennsylvania; area about 1,250 sq. m.; pop. in 1870, 43,909. It is partly bounded N. by Cattaraugus creek. The surface is hilly, but there are few mountains of considerable altitude. The soil is rich and productive, yielding good crops of grain and affording excellent pasturage. The Alleghany river and the numerous creeks which flow through the county furnish motive power. Bog iron ore, peat, marl, manganese, and sulphur are found in different places; salt springs have been discovered, and petroleum springs exist in the E. part. Cattle and lumber are the principal exports, the transportation of which is greatly facilitated by the Erie railway, which traverses the county, and by the Genesee valley canal, which extends from Rochester to

Olean. The county is also traversed by the Bradford branch of the Erie and by the Atlantic and Great Western railroads. The chief productions in 1870 were 84,926 bushels of wheat, 160,602 of Indian corn, 783,387 of oats, 340,803 of potatoes, 144,919 tons of hay, 889,132 lbs. of cheese, 2,700,265 of butter, 110,063 of wool, 458,723 of maple sugar, and 35,121 of hops. There were 10,687 horses, 44,463 milch cows, 18,583 other cattle, 26,739 sheep, and 10,738 swine. There were 44 cheese factories, 15 tanneries, 8 currying establishments, 76 saw mills, 8 manufactories of agricultural implements, 11 of cheese boxes, 38 of carriages and wagons, 12 of furniture, 6 of iron castings, 18 of saddlery and harness, 7 of sashes, doors, and blinds, 14 of tin, copper, and sheet-iron ware, 2 of woollen goods, and 13 grist mills. Capital, Little Valley.

CATTARO (Slavic, *Kotor*), a town of Dalmatia, Austria, capital of a circle of its name, at the foot of the Montenegro mountains, at the S. E. extremity of the gulf of Cattaro, 337 m. S. E. of Trieste, and 43 m. N. W. of Scutari, Albania; lat. 42° 25' N., lon. 18° 46' E.; pop. about 3,000; of the circle, 36,000. The town was almost entirely destroyed by the earthquakes of 1563 and 1667. The streets are narrow, but the town is fortified by a castle on a cliff in the vicinity, and the port was made a naval depot in August, 1854. The harbor, although one of the best in the Adriatic, is little frequented by shipping; but it has a fair share in the commerce of Dalmatia. The trade of Cattaro is carried on by tribes: the Dobrotas, who trade with Trieste, the Perastros, with Venice, and several others. The principal articles of trade are wine, oil, figs, wool, silk, honey, wax, tallow, smoked meat, dried fish, butter, eggs, cheese, and charcoal. Outside the E. gate of the town is the bazaar, which is supplied with provisions by the Montenegrins. The principal buildings are the cathedral, a collegiate church, numerous other Roman Catholic churches, 2 Greek churches, 6 convents, a hospital, a gymnasium, and the residences of the governor and the bishop. The popular language is the Slavic dialect of Herzegovina, but Italian is the language of the educated classes, and used in the transaction of public affairs. The majority of the population of the town and circle consists of descendants of the Slavs who invaded the country in the 7th century; the rest of Italians, Bosnian Greeks, Serb Morlaks, Jews, Greeks, and gypsies. The Roman Catholic is the established religion, but about a quarter of the population profess the Greek faith.—In the middle ages Cattaro was the capital of a prosperous republic. In 1420 it submitted to the Venetians; in 1797 it was annexed to Austria; in 1805, by the treaty of Presburg, it was incorporated into the French kingdom of Italy, but did not pass into the possession of the French till 1807, having been occupied by the Russians in the interval. Finally, in 1814 it reverted again to Austria. In 1849 Cattaro organized an independent

government, but in January, 1850, was brought back under the sway of Austria. The circle of Cattaro was the seat of the Dalmatian insurrection of 1869.—The gulf of Cattaro, or *Bocche di Cattaro*, the Rhizonic gulf of antiquity, is a tortuous inlet of the Adriatic, 30 m. long, forming three basins connected by narrow straits, with an entrance from the sea only a mile and a half wide. It is surrounded by mountains, and is renowned for the beauty of its scenery. The fort of Castelnuovo defends the entrance.

CATTEGAT, or *Kattegat*, a large strait lying between Gothland in Sweden and Jutland, communicating with the North sea through the Skager Rack on the north, and with the Baltic through the Sound and the Great and Little Belts on the south; length 150 m.; breadth in the central part about 90 m. It is difficult of navigation, being not only shallow toward the shores and irregular in depth, but obstructed by several sand banks, one of which lies in the middle of the channel. The chief islands are Læsø, Anholt, and Samsø.

CATTERMOLLE, George, an English artist, born at Dickleburgh, Norfolk, in 1800, died in 1868. He is best known as a painter in water colors, although in his later years he worked chiefly in oil. Scenes from the feudal ages and the times of the English civil wars, which permitted him a variety of ornamentation and warm coloring, were his favorite themes. His most celebrated pictures are "Luther before the Diet of Spire," "Raleigh witnessing the Death of Essex," and the "Skirmish on the Bridge." He painted innumerable interiors of church and castle, together with designs illustrative of Scott's novels, Shakespeare's plays, the times of the English cavaliers, &c.

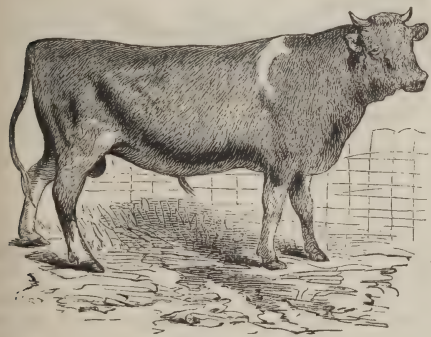
CATTI, or *Chatti*, an ancient German people, who according to Cæsar lived beyond the Ubii, whose seat was about Cologne, and were divided inland from the Cherusci by a wood which he calls *Bacenis*. Tacitus states that their country lay between the Rhine and Danube, extending from the Black Forest on the south to what were called the *Decumates Agri*, a tract of land which paid tithe to the Romans, and lay along the latter river, to the northward. If both statements be accurate, their territory must have been very extensive, including Hesse-Cassel on the north and Baden on the south. Tacitus describes their character, habits, and manner of life as far less barbarous, so far at least as regards their military tactics, than those of the other German tribes. Their force lay in their infantry, whom, besides their arms, they loaded with tools and provisions. They did not allow their young men to cut their hair or trim their beards until they had slain an enemy; and all youths of unusual strength and size were compelled to wear an iron ring until they should have gained the right to remove it by slaying a man in battle. They had no individual property in land or houses, but held everything in common. The Romans gained

many advantages over them under Drusus and under Germanicus, who destroyed Mattium, their chief town, but never wholly conquered them. They are last mentioned as existing toward the close of the 4th century, and afterward disappear among the Franks.

CATTLE, a class of domestic animals. In its primary sense, horses and asses are included in the term, as well as oxen, cows, sheep, goats, and perhaps swine. In England, beasts of the ox species are more precisely described as black cattle or neat cattle. In the United States, the term cattle is usually applied to horned animals alone. Like that of many other species of animals now domesticated, as the sheep, the dog, and our common barnyard poultry, the origin of the domestic ox cannot be traced distinctly to any type now existing in a state of nature. The distinctive characteristics of the common domestic cattle are smooth unwrinkled horns, growing sideways at their origin, and directed upward, or in some breeds downward and forward, with a semi-lunar curve. The forehead of the common ox is flat, longer than it is broad, and has the round horns placed at the two extremities of a projecting horizontal line, separating the front from the occiput; but the horns themselves differ so widely in the different breeds, which have been the result of thousands of years of domestication, that no specific character can be founded upon them. In color, like all highly cultivated domestic animals, they run through all hues and shades, from the plain blacks, whites, browns, reds, duns, grays, and blues, to every variety of piebald, mottled, spotted, flecked, or brindled; the colors being in some degree distinctive of the various select breeds. Thus the Devonshires run to self-colored red and light tan or dun; the Durhams to dark red piebald, with the white portions sometimes flecked or sanded, though this is rather an Ayrshire mark; the Alderneys to light red or yellow, and white; the Ayrshires to roan and piebald; and the small Scottish kyloes, or mountain oxen, to self-colored blacks, reds, and brindles. In Calabria there is still a large breed of snow-white cattle, formerly in great request for sacrificial purposes, which has descended unchanged from classic ages; and every traveller in Italy knows the large, gentle, gray and mouse-colored oxen of the Campagna. In Hungary there is a remarkable breed of gray or dark blue cattle, which have wide-spreading horns and coarse flesh, but fatten easily. In the East there exist many singular and distinct species, the most remarkable of which is perhaps the celebrated sacred or Brahman bull; a heavy, indolent, phlegmatic animal, with short reflected horns, large pendulous ears, and an enormous hump and dewlap of solid fatty matter. Its coat is smooth, and sleeker than even that of the common cattle, while its form approaches nearer to that of the bison. Besides this, they have the huge, morose, almost hairless buffalo, both wild and

half domesticated, with its great, erect, crescent-shaped horns, of 18 inches girth at the root, and 4 or 5 feet measure round the exterior curve; the little, hump-backed zebu; the yak, or grunting ox of Thibet, with a tail like that of a horse; and probably many other varieties, yet imperfectly known and undescribed.—It was formerly supposed that domestic cattle were descended from the wild European bison, *bos urus* (see AUROCHS); but Cuvier has shown this idea to be erroneous, by pointing out permanent characteristic distinctions in the osseous structure, particularly in the formation of the skull and insertion of the horns. It appears that there has been generally overlooked by naturalists a race of perfectly wild cattle peculiar to the British isles, which, formerly known as the wild bull of the great Caledonian forest, seems to have ranged all the woody northern regions of the island. They were of medium size, compactly built, invariably of a dingy, cream-colored white, with jet-black horns and hoofs, and the upper half of the ears either black or dull red. They are represented as having formerly had manes; but that characteristic is lost. Within a few years three herds of these cattle were in existence: one in the chase of Chillingham castle, the property of the earl of Tankerville, in Northumberland; one in that of the duke of Hamilton, at Hamilton castle, in Scotland; and one at Drumlanrig, in Dumfriesshire. Lord Tankerville's herd were red-eared; those of the duke of Hamilton had the black ears which are considered characteristic of the pure Scottish race. Although kept in confinement within vast enclosed chases, these cattle were perfectly wild, tameless, and savage. They would hold no connection with other cattle, more than the red deer will with the fallow; they would not brook the approach of man, and evinced their original wild nature by the pertinacity with which the cows concealed their calves in deep brakes of fern or underwood, and resisted any approach to their lair. The structural characteristics of these cattle differ in no respect from those of the domestic ox; their invariable self-color is a certain evidence of the purity and antiquity of their breed, as it is a strong proof that they are not the descendants of tame animals, relapsed into a savage state; since such, as is the case with the South American herds, long retain their variegated hues, the tokens of domestication and servitude.—Of the cattle of continental Europe, the Polish or Ukraine oxen are large and strong, and fatten readily, the flesh being succulent and well flavored. The cows are shy, not fit for the dairy; color light gray, seldom black or white; oxen docile at work. On the plains of Jutland, Holstein, and Schleswig there is a fine breed with small, crooked horns, supposed to be allied to the Friesland and Holderness breed; colors various, mouse or fawn interspersed with white being most common. Red cows of this breed are seldom seen. The cows are good milkers in

moderate pastures. The oxen fatten well when grazed or stall-fed at the proper age, being fine in horn and bone, wide in loin, but not as hardy and strong for labor as the Hungarian breed. Nearer the Alps the cattle are stronger and more active. The largest are among the Swiss. The Fribourg race have very rich pastures in the vicinity of Gruyères. The cows most prized are large and wide in the flank, strong in the horn, short and strong in bone; they show a prominence about the root of the tail which would be considered a blemish by short-horn breeders. Their milk is rich in pasture, or when stall-fed on clover or lucern; the oxen are good workers, but heavy and slow, and fatten well. In the Jura there is a small, active mountain breed, that keep well on little food; they are of a light red color; oxen active and strong for their size, drawing by the horns. They are not profitable for stall-feeding, but good for mountain cottagers, as they climb like goats, feeding on the patches of pasture. The Norman breed give character to all the cattle in the north of France, except near the eastern frontier; they are light red, sometimes spotted with white; horns short, set well out, and turned up with a black tip; legs fine and slender; hips high; thighs thin; good milkers, with rich milk. They are usually fed on thin pastures, along roads and the balks which divide fields. In Normandy the pastures are better, and the



Alderney Bull.

cattle larger. The Alderneys or Jerseys, in France, are supposed to be a smaller variety of the Norman, with shorter horns and more deer-like forms. This breed is very docile, having been for generations accustomed to be tethered in fields, along the roads, or in yards. They are found in gentlemen's parks and pleasure grounds in England. A large number have been brought to the United States, but they are not considered so profitable as some other breeds. The Italian breed is most remarkable for immense length of horn. No pains is expended on this breed except in northern Italy, where the Parmesan cheese is made. The Italian cattle resemble the Swiss. —In England the breeding of cattle has been carried to the greatest perfection. Cæsar

states that the British in his time had great numbers of cattle, though of no great bulk or beauty. The island being divided into many petty sovereignties, cattle were the safest kind of property, as they could be driven away from danger. When more peaceful times returned, cattle were neglected for other productions, their size and number diminished, and not until within the last 150 years was any considerable effort made to improve them. The breeds in England are as various as the districts they inhabit, or the fancies of the breeders. A curious classification by the horns has obtained, having been found useful. The long-horns, originally from Lancashire, were much improved by Mr. Bakewell of Leicestershire, and are now found in the midland counties. The short-horns first appeared in Lincolnshire and the northern counties, but are now found in most parts of the island. The middle-horns, a valuable and beautiful breed, came from the north of Devon, the east of Sussex, Herefordshire, and Gloucestershire. The crumpled horn is found in Alderney, on the south coast, and in almost every park in small numbers. The hornless or polled cattle were first derived from Galloway, and now prevail in Suffolk and Norfolk. Which is the original breed of all has been disputed. It is held by some that the long-horns are of Irish extraction; that the short-horns were produced by the efforts of breeders; while the polled, though found in certain places from time immemorial, are supposed to be accidental; and that to the middle-horns must therefore be ascribed the honor of being the original breed. As the natives of Britain retired before invaders, they drove their cattle to the fastnesses of north Devon and Cornwall, the mountain regions of Wales, the wealds of Sussex; and there the cattle have been the same from that time until now, while on the eastern coast the cattle became a mongrel breed, conforming themselves to pasture and climate. Observation proves that the cattle in Devonshire, Sussex, Wales, and Scotland are essentially the same —middle-horned, not great milkers, active workers, easy to fatten; all showing traces of likeness to one breed, however changed by soil, climate, and time.—The earliest importation of cattle to America was made by Columbus in 1493; he brought a bull and several cows. Others were brought by succeeding Spanish settlers, of the Estremadura breed, and the vast pampas or plains of nearly the whole of Spanish America are now covered with immense herds of cattle descended from these. They are of large size, long-legged, as various in color as other breeds, and their distinguishing characteristic is their long and widely extended horns. Herds numbering many thousands roam at will in a wild state, under the care of a race of herdsmen called gauchos. (See GAUCHOS.) Every year the calves are caught, branded with the marks of the respective owners of the herds, and turned loose again. The mode of captur-

ing the cattle is by the lasso or the bolas, and when thus caught the wildest are soon reduced to submission. Those which are retained for dairy and other domestic purposes are kept in



Long-Horned Brazilian Ox.

staked enclosures, capable of holding thousands of head, and called *estancias*. The lactiferous qualities of the cows of this breed are far below those of European and American domesticated cattle, but the milk is exceedingly rich, and particularly adapted to cheese making. Colombia, Venezuela, Brazil, and the Argentine Republic are the great cattle-raising countries of South America. In Ecuador, Chili, Peru, and Bolivia the cattle are domesticated. For many years cattle raising was almost the only pursuit of Californians, and it is still the calling of a large number of the people. In California, and also in Texas, the cattle of 20 or 50 owners roam over the pastures of all, every animal bearing on the left hip the brand, or "iron" as it is termed, of its owner; and the keepers or herders of these cattle are as expert as the South Americans with the lasso. (See *BOLAS*, and *LIASSO*.)—The Portuguese took cattle to Newfoundland about 1553, but no trace of them now exists. Norman cattle were brought to Canada about 1600. In 1611 Sir Thomas Gates brought from Devonshire and Hertfordshire 100 head to Jamestown. In 1624 Francis Winslow brought three heifers and a bull to Massachusetts. At this period no fixed breeds, as such, were known in England. In the United States there is now a class of native cattle, arising from a mixture of various breeds imported by the early settlers, who, for the want of barns, and from habits established in a milder climate, allowed their cattle to suffer severely; many perished, the survivors degenerating in size and quality. As agriculture advanced and settlers became more prosperous, the cattle were improved; and there are to be found in different districts native cattle varying with the richness of soil, salubrity of climate, and care of breeders. The English breeds, gaining celebrity, attracted the attention of enterprising breeders here, who com-

menced importing the Durhams, Devons, Ayrshires, Herefords, and Alderneys, with a few Galloways and some long-horns, and occasionally a few Scotch cattle. These cattle, imported at great cost, and not inured to our climate and rough treatment, prospered only in the best situations, and for a long period attracted little attention from ordinary farmers. At present there are many places where the pure breeds are propagated, each having its advocates; while farmers who make money from milk, butter, and cheese, stoutly maintain the value of native cattle and their crosses with the best breeds. There are, however, few neighborhoods where traces of imported blood may not be found; indeed, the high prices for cattle and their products which have prevailed since 1850 have done much to stimulate breeders to improvement. The short-horn or Durham is becoming the favorite breed in the West. The model of this breed forms a solid rectangle, or parallelopiped, when the head and legs are re-



Short-Horn Durham Bull.

moved, leaving no unfilled space and much solid meat with little offal. Of this breed "Allen's American Short-Horn Herd Book" says: "They are, as a race, good milkers, remarkable in the richness of its quality, and the quantity is frequently surprising. For beef, they are unrivalled. Their capacity to accumulate flesh is enormous, and they feed with a kindliness and thrift never witnessed in our native breeds. In milk, instances have been frequent in which they have given 24 to 36 quarts a day, on grass pasture only, for weeks together; yielding 10 to 15 lbs. of butter per week. Cows have slaughtered 1,200 to 1,500 lbs. neat weight, with extraordinary proof; and bullocks upward of 2,500 lbs." The short-horn crosses with native stock are much prized, forming good milkers, easy keepers, and profitable animals for beef, and in the hands of ordinary farmers prove better than the pure breed of short-horns. About 1835 some Ayrshires were imported, and this breed has ever since borne in the United States a high character for milk, yoke, and

shambles. The Hereford breed does not seem to find general favor. A large herd of Alderneys, of the most symmetrical proportions for that breed, was imported some years since, and



Dolly Ayrshire Cow.

seem admirably adapted to light thin pastures. Though their milk is very rich, the quantity is small. They are poor for beef, and not famous as workers; some breeders in the eastern states, however, believe them to be very profitable for butter and cheese. The long-horns have been sparingly imported, and do not find favor. The Sussex are better liked, though few have been introduced, while their supposed congeners, the Devons, are held by many intelligent men to be superior to the Durhams for all the southern and most of the older states. Being an original breed, and without cross or admixture of blood, they have sustained a superior capability of improvement among the best breeders wherever they have been bred with care. The hide is soft and mellow, indicating an aptitude to fatten, the bones small, and in color, grace, and elegance of carriage, they possess a superiority over all other British cattle. The little Kerry cow of Ireland, termed the "poor man's cow,"



Kerry Bull.

has been recommended for poorer lands in mountainous regions, but as yet no steps have been taken to introduce her there.—Cattle have many complaints, yet generally they are exempt

from great mortality. Sometimes, however, an epidemic, spreading even to remote countries from its starting point, carries off great numbers. (See MURRAIN.) Occasionally the "milk sickness" appears in some districts W. of the Alleghanies, when the animal sickens and dies, giving the peculiar disease to all who partake of her milk or flesh. It is supposed to originate from the *rhus toxicodendron* or poison ivy. The remedy is feeding large quantities of Indian corn. The horn distemper and hoof ail sometimes prevail extensively, and about cities where the cattle are closely confined and badly fed, they become ulcerated and otherwise diseased. No class of animals are so free from maladies as neat cattle when well treated. Good pasturage, good hay, grain, roots, and water, and airy stables, with sufficient exercise, are necessary to maintain good health in cattle or to improve their condition. Variety of food is essential, and the feeding of roots in winter is particularly necessary. The practice of soiling in summer has found favor. The cattle are kept in cool, clean stables, and green rye, oats, corn sown broadcast, lucern, clover, and sorghum are cut and carried to them. (See CALF, and Ox.)

CATTLE PLAGUE. See supplement.

CATTYWAR, or **Kattywar**, a peninsula in N. W. India, forming a considerable part of the province of Guzerat, or the Guicowar's dominions, bounded N. by the gulf and run of Cutch, N. E. by the British provinces of Rajpootana and Malwa, E. by the gulf of Cambay, and S. and W. by the Arabian sea. It lies between lat. 20° 42' and 23° 10' N., and lon. 69° 5' and 72° 14' E. The principal product is cotton. The grains chiefly cultivated are wheat, maize, and millet. The sugar cane is grown extensively, but is only made to produce molasses or *goor*. The Cattywar horse, once celebrated, has deteriorated. A breed of kine called *desam* and buffaloes are much valued. The soil is sandy and not fertile, but numerous streams and wells afford ample means of irrigation, all the rivers taking their rise in the central part of the province. Toward the south some of the hills are over 1,000 ft. high. Deep ravines and caverns are very numerous, and afford safe retreats against attack. A locality of wooded hills called the Gir is haunted by wild animals of the most ferocious kind, and noted for its deadly climate. The ravages of migratory rats produced such a terrible famine in 1814, that this year has since been called the rat year. (See GUZERAT.)

CATULLUS, **Caius Valerius**, a Roman poet, born in Verona in 87 B. C., died in or after 47. He belonged to a noble family, and his father was a *hospes* of Julius Cæsar, a tie sacred among the Romans. The son went to Rome, and became acquainted with Cornelius Nepos, Cicero, and other notable men; but possessing a moderate fortune, he did not enter upon public life, living in retirement at Rome and at his villa near Tibur. He is the earliest Latin lyric poet of any importance. We have 116 poems of Ca-

tullus, mostly short and without arrangement by subjects; a few are strictly lyrical, some are elegiac, one is heroic, but most are epigrammatic. From his imitation of the Greeks, Catullus was called *doctus*, but he possessed much originality; there is in his style a certain air of antiquity which the Romans greatly admired. The text of Catullus seems to have been early corrupted; all MSS. are derived from one source, and that an imperfect one. There are several poems of unknown authorship which are ascribed to Catullus; the elder Pliny mentions *De Incantamentis*; and *Ciris* and *Perrigilium Veneris* have been attributed to him, but the latter is now generally believed to have been written by Florus in the 2d century. In his epigrammatic poems the Roman spirit prevails, and in the elegiac the Greek. Most of his epigrams are pleasant light impromptus, full of irony and satire, of various forms and on a great variety of subjects; they contain many obscure passages and some allusions offensive to modern ears; they are composed in 13 different metres. The elegies are imitations of the Greek, especially of Callimachus and Sappho; they exhibit, however, great vigor of language, and less frivolity than his epigrams. A good edition of his works is that of Sillig (Göttingen, 1823); of more recent editions, one of the best is that of R. Ellis (1866). They have been translated into English by G. Lamb (1821), T. Martin (1861), J. Cranstoun (1867), and R. Ellis (1871).

CATULUS, the name of a Roman family of the plebeian gens Lutatia. **I. Caius Lutatius**, consul with Aulus Postumius Albinus in 242 B. C. On March 10, 241, he won a great and decisive naval victory over the Carthaginians, near the island of Ægusa. This battle put an end to the first Punic war, compelling Hamilcar to agree to most disadvantageous terms of peace. Catulus claimed and obtained a triumph, which was celebrated on Oct. 4.

II. Quintus Lutatius, consul with Caius Marius in 102 B. C., died in 87. He entered upon his term of office just as a powerful body of northern tribes were preparing to descend upon Italy. Marius, with one portion of the army, was sent to oppose the Teutons, who were about to enter the country from Gaul in the neighborhood of the modern Nice; while Catulus undertook to oppose the Cimbri who were advancing from the Tyrol. He took up a position not far from the source of the Adige, and awaited their attack; but the enemy, in spite of his opportunities for defence, assailed him with such violence as to drive his army across the Po. Marius, who had meanwhile defeated the Teutons at the battle of Aquæ Sextiæ, and returned to Rome, now hastened to aid his colleague. His army and that of Catulus recrossed the Po and defeated the Cimbri at Vercellæ (Vercelli). The accounts of this battle, which was fought in July, 101, are rendered most obscure by the jealousy of partisan writers, some of whom give all the

glory to Marins, others to Catulus. It undoubtedly belonged to the former, if the accounts of the public feeling at Rome are to be trusted. In the civil war Catulus espoused the cause of Sulla, and was among those named in the lists of the proscription of 87 B. C. He preferred suicide to falling by the hands of his enemies, and killed himself by suffocation with the fumes of charcoal. **III. Quintus Lutatius**, son of the preceding, died in 60 B. C. He earned distinction by his honesty and patriotism, and was made consul in 78. He quelled a revolution which his colleague Lepidus excited after the death of Sulla. In 65 he was made censor. Catulus is highly praised by Cicero, whom he earnestly aided in the suppression of Catiline's conspiracy.

CATURZE, Jean, a French heretic, born at Limoux, died at the stake at Toulouse in June, 1532. He was a popular professor of law and other sciences, and was driven in 1531 from his native place on account of his heretical doctrines. The next year he was arrested in Toulouse and sentenced to be burned. The accounts are conflicting in regard to the precise facts, but it is certain that he was put to death as a heretic, and that his friends, and especially his pupils, regarded him as a martyr. Étienne Volet, who defended him in a public speech (Oct. 9, 1532), was himself eventually doomed to a martyr's death in Paris, Aug. 3, 1546. Rabelais alludes to the tragic end of Caturze in his *Pantagruel*.

CAUCA, a river of South America, rising in that part of the Colombian Andes called Paramo de Guánacos, in the United States of Colombia, lat. 2° N., lon. 76° 30' W. On descending from the mountains, its course is W. until about 15 m. W. of the town of Popayan, where it bends N., and flows with the impetuosity of a mountain stream almost parallel to the Magdalena, which river it enters at the town of Nechi, lat. 9° N. The whole course of the Cauca is about 600 m.; it is navigable only for small craft, and not above Cali, which, with Toro, Buga, Antioquia, and Nechi, are the principal towns upon its banks. The valley which it waters, lying between the W. and central Cordilleras of the Andes, is one of the most fertile in the western continent.

CAUCA, a state of the United States of Colombia, bounded N. by the Caribbean sea, E. by Cundinamarca, S. by Ecuador, and W. by the Pacific ocean; area, 260,000 sq. m.; pop. about 435,000. It is traversed by the river of the same name, and is one of the richest, most fertile, and most populous districts in South America. It consists of two plateaus of different elevation, and consequently of different temperature; the land is well cultivated, and produces the various cereals, coffee, sugar, tobacco, cotton, and cocoa, the last being especially abundant; and vast and rich pastures afford nourishment for innumerable herds of cattle and mules. The fields and farmhouses present the appearance of wealth and comfort. Gold

has been found in the upper part of the valley. Capital, Popayan.

CAUCASIA. See CAUCASUS.

CAUCASIAN RACE. See ETHNOLOGY.

CAUCASUS, a general name given to the region and the chain of mountains therein which stretch between the Black and Caspian seas, the mountains forming part of the boundary between Europe and Asia. The region traversed by the range diagonally from N. W. to S. E. forms the Russian lieutenancy of Caucasia. It lies between lat. $38^{\circ} 50'$ and $46^{\circ} 30' N.$, and lon. 37° and $50^{\circ} 30' E.$ Its longest diameter, N. W. to S. E., is about 800 m.; area about 170,000 sq. m.; pop. in 1867, 4,661,824. It is divided into the following governments and districts: Kuban, Stavropol, Terek, Daghestan, Zakatal, Tiflis, Kutais, Sukhum, Tchernomore (Black Sea), Elisabethpol, Baku, and Erivan. The first five, which lie in Europe, are called Ciscaucasia, and embrace, among others, the territories of the Kuban and Nagai Cossacks, the Kabarda, the Tchetchna, and the land of the Lesghians; the last seven lie in Asia, are designated as Transcaucasia, and include Circassia, Abkhasia, Mingrelia, Imerethia, Georgia, Russian Armenia, and Shirvan. An outline of the central part of the country would represent a system of round-topped mountains, exhibiting few of those peaks which distinguish the Alpine and other chains, their sides seamed with deep but fertile valleys, descending to the steppes or plains which stretch N. into the main country of the Cossacks, and S. E. toward Persia. The Caucasus range commences in a line of cliffs fronting on the Caspian sea, at the peninsula of Apsheron, whence the main chain stretches in a N. W. direction to the shores of the Black sea, a distance of 700 m., and terminates in the promontory where the sea of Azov unites with the Black sea, near the Russian fortress of Anapa. From the main chain other ranges branch N. and S., giving the hill country a width of from 65 to 150 m. The principal subsidiary chains are on the north. The principal summits are Mount Elbruz or Elburz, on the N. E. confines of Abkhasia, 18,514 ft. high; Kasbek, W. of the road from Mozdok to Tiflis, about 16,500 ft. (like the preceding, first ascended by three young English tourists, Freshfield, Tucker, and Moore, in July, 1868); and Syrkhubarsom, between Elbruz and Kasbek, about 15,600 ft. The passage of these mountains is effected through defiles, some of which have a historic celebrity. Such are the Caucasian, now called the Darial pass or pass of Vladikavkas; the Albanian or Sarmatic pass in Daghestan; and the Iberian, now called the Sharapan pass, in Imerethia. Only one road is practicable for carriages, that from Mozdok to Tiflis, by the Darial pass and the valley of the Terek. The mountains of the Caucasus are either flat or round-topped. The geological structure of the greater portion is of secondary formation, interspersed with volcanic rocks. The

summits and central ridge are granitic; on each side the granite has schistose mountains joining it, and these are succeeded by calcareous hills whose bases are covered by sandy downs. The mountains are more abrupt on their north face; southward they descend by a succession of terraces. Snow rests on summits over 11,000 ft. in altitude throughout the year. The glaciers are but of limited extent, and no active volcanoes are known. Earthquakes occur. There are few lakes. Twelve watersheds or channels are counted, six on the N. slope, and six on the S. The principal rivers on the northward are the Kuma and the Terek, flowing E. to the Caspian, and the Kuban, W. to the Black sea. On the S. the Kur (the Cyrus of the ancients) flows E., and the Rion (Phasis) W.—The country of the Caucasus possesses every variety of climate, from the arid heats of the valley to the cold of perpetual snow. Vegetation in the habitable districts is luxuriant. Forests of the finest timber clothe the hills almost to the snow line. Grain will grow at an elevation of 7,000 ft. In the central belt the ordinary species of fruits produce well. Dates, pomegranates, and figs ripen in the valleys. Rice, flax, tobacco, and indigo are sure crops. The culture of sugar cane, silk, and cotton has been introduced into some localities. The tea plant has been recently introduced at Sukhum Kaleh, on the Black sea. Among the productions peculiar to the Caucasus are a species of cochineal insect; a hard-wood tree called locally *utchelia*, with wood of a rose color, suitable for cabinet work; also the Caucasian goat, celebrated for the value of its hair; and a wild animal of the feline species, called by the natives *chaus*. The horses of the Caucasus bear a high character for endurance and docility. Wild cattle are found in the forests. Wolves, bears, jackals, lynxes, and the minor fur-bearing animals, are numerous. The wool of the ordinary breeds of sheep is long and fine. Almost every species of birds known to the latitude are found here. Few minerals have been discovered; gold appears to be totally wanting; iron, copper, saltpetre, and lead are found, the last in considerable quantity.—The Caucasians proper, including Circassians, Mingrelians, Abkhasians, Ossetes, Tchetchentzes, Lesghians, Grusians, and many other tribes, of Indo-European race, are generally a bold and resolute people, hunters, robbers, and guerillas from choice, shepherds and agriculturists only from necessity. Although hospitable, they are jealous and revengeful. They live in villages built of stone. Formerly their youth of both sexes were raised for sale in the slave markets of Constantinople; but that traffic has been suppressed. Their political organization was formerly a loose sort of republicanism, under the nominal presidency of a hereditary prince; but the rule of Russia is now firmly established over them. Literature they have none. Their religion is an offshoot of Mohammedanism, corrupted from many sources.—An-

cient history makes frequent mention of the Caucasus. Here Prometheus was chained. Deucalion, Pyrrha, and the Argonauts, Sesostris and the Egyptians, the Scythians, Mithridates, Pompey, and Trajan are associated with its history. The Arabs, Tartars, and Turkomans successively ravaged the country to its base. Russia and Persia then struggled for its possession, until in 1813 the Russians, after having occupied Mingrelia, Imerethia, and Georgia, became nominally possessed of the S. E. parts of the mountains by treaty. A desultory warfare of several years ended by the mountaineers being reduced to a condition nearly approaching subjection. But in 1823 a new movement sprung up in the mountains. Mohammed, the mollah, commenced against the Russians a campaign in Daghestan. A chieftain named Kasi-Mollah was soon recognized as the head of the movement, having for his aid a young man named Shamyl. In 1829 the N. W. portion of the mountains fell into the hands of the Russians by the treaty of Adrianople, but the Circassians soon rose in arms against them. The various tribes now united in resistance, but the Lesghians and Tchetchentzes bore the brunt of the struggle. Kasi kept up a resistance to the Russian power till 1831, when he was shut up in Hinry. The Russians stormed the place, and the chief was slain. Hamsad Bey next took the field, but his career was cut short by assassination. The mollah Mohammed being now dead, Shamyl was elected his successor, and carried on the war with varying success. In 1837 Shamyl inflicted a severe defeat on the Russians under Gen. Ivelitch. During 1838 the Caucasians were employed in preparing themselves for future resistance. The passes of the mountains were fortified, and the strong position of Akulgo was put in readiness to stand a siege. In 1839 the Russians, under Gen. Grabbe, entered the territory, defeated the Caucasians, and drove them back upon Akulgo, which was finally taken, Aug. 22, after a blockade of 72 days, and three days' hand-to-hand fighting. The Caucasians once more nominally succumbed to the Russian power, but in March, 1840, they again revolted. Having found European tactics ineffective in the previous campaign, they fell back on their old system of guerilla warfare. Gen. Grabbe again attempted to penetrate into the mountains, but was compelled to retreat. The next attempt was made in 1845 by Prince Vorontzoff, governor general of the Russian Caucasian provinces. He penetrated to Dargo, which he found in flames. The campaign being over, a new plan of action was introduced against the mountaineers. Hitherto the tactics had been to bring them to pitched battle, with the hope of breaking their strength at a single blow. Now the plan was to send detached columns against isolated spots, and wherever a footing was obtained to erect a fort on it. Notwithstanding this, the Caucasians continued to

carry on offensive operations. In 1846 they swept the line of Russian forts, and returned to their mountains laden with plunder. In 1848 and 1850 they made similar expeditions, and in 1853 they took from the Russians several guns, and drove them back from eight leagues of territory. During the Crimean war there was a pause in the operations in the Caucasus. In 1856 the Russians opened a warfare, which they continued till April, 1859, when the capture of the stronghold of Veden virtually decided the contest. Shamyl retreated to his last stronghold, the mountain fort of Ghunib, near the Caspian sea. Here, on Sept. 6, he was defeated after a desperate conflict and forced to surrender, and was carried a prisoner to Moscow and St. Petersburg, but treated with the utmost consideration. The Caucasus had in many parts become desolate. The bulk of surviving Circassians emigrated to Turkey. (See SHAMYL.)

CAUCASUS, Indian. See HINDOO-KOOSH.

CAUCHON, Joseph, a Canadian statesman and journalist, born in Quebec in 1820. He studied law, but, though admitted to the bar, never practised. In 1844 he was elected to the legislature for the county of Montmorency, and has been a member of parliament since that time. In 1851 he was offered a seat in the cabinet, but declined. The next year he attempted to form a French Canadian conservative opposition, but without success. In 1855 he became a member of the administration as commissioner of crown lands, and under his name a report was published attacking the monopoly of the Hudson Bay company. From 1867 to 1872 he was speaker of the senate. He afterward resigned his place in the administration and went into opposition. In 1842 he founded the "Quebec Journal," and has conducted it ever since.

CAUCHY, Augustin Louis, a French mathematician, born in Paris, Aug. 21, 1789, died May 23, 1857. Admitted in 1805 to the polytechnic school, he distinguished himself by the solution of difficult problems. He was admitted to the academy in 1816, and about the same time appointed professor of mechanics in the polytechnic school. The journals of the academy and several European mathematical journals contain numerous memoirs from his pen. His attachment to Bourbon legitimacy prevented him from taking the oath of allegiance, by which alone he could retain the public offices which he held in 1830, or accept those offered him on subsequent occasions. In 1848, however, he was appointed to the chair of mathematical astronomy which was then instituted at the Paris university; but refusing to take the oath of allegiance, he relinquished his post in June, 1852. He made contributions to almost every branch of mathematics, but his reputation rests chiefly on his residual and imaginary calculus. Among his numerous works are: *Cours d'analyse* (Paris, 1821); *Leçons sur les applications du calcul infinitésimal à la géométrie* (2 vols., 1826-78); *Exer-*

cices mathématiques (1826-'9); *Sur l'application du calcul de résidus* (1827); *Leçons sur le calcul différentiel* (1829); *Mémoire sur la dispersion de la lumière* (1836); and *Exercices d'analyse et de physique mathématique* (3 vols., 1839). His politico-religious writings testify both to his faith in legitimacy in politics, and in Roman Catholicism in religion. One of his most characteristic works of the kind is his poem *Charles V. en Espagne* (1834).

CAUCUS, a word of American origin, employed in the United States to designate a part of the political machinery of the country, which, though resting merely on usage, forms a marked feature of the American political system. The oldest written use of this word is probably in the following passage in John Adams's diary, dated Boston, February, 1763: "This day learned that the caucus club meets at certain times in the garret of Tom Dawes, the adjutant of the Boston regiment. He has a large house, and he has a movable partition in his garret which he takes down, and the whole club meets in one room. There they smoke tobacco till you cannot see from one end of the garret to the other. There they drink flip, I suppose, and there they choose a moderator who puts questions to the vote regularly, and selectmen, overseers, collectors, wardens, fire wards, and representatives are regularly chosen before they are chosen by the town. They send committees to wait on the merchants' club, and to propose and join in the choice of men and measures. Capt. Cunningham says they have often selected him to go to those caucuses," &c. Gordon, in his "History of the American Revolution," under date of 1775, traces this practice to a much earlier date: "More than 50 years ago Mr. Samuel Adams's father and 20 others, one or two from the north end of the town where all the ship business is carried on, used to meet, make a caucus, and lay their plans for introducing certain persons into places of trust and power. When they had settled it, they reported and used each their particular influence with his own circle. He and his friends would furnish themselves with ballots, including the names of the parties fixed upon, which they distributed on the days of election. By acting in concert, together with a careful and extensive distribution of ballots, they generally carried the elections to their own mind. In like manner it was that Mr. S. Adams first became a representative for Boston." It has been conjectured that caucus is a corruption of *calkers*. Very possibly the caucus club which met in Tom Dawes's garret was originally a mechanics' club, called from the leading trade in it the *calkers'* club, which name, with a variation, it still retained after it had passed into the hands of politicians. Mr. J. H. Trumbull derives the term from an Algonquin word meaning to speak, encourage, instigate. The singular of the Indian noun is said to have been *kaw-kaw-wus*, plural *kaw-kaw-wus-sough*, "counsellors," which the Vir-

ginians changed into *cockarouse*, designating a petty chieftain, and that thence come caucusers and caucuses.—The change of government consequent on the revolution led, in the northern states especially, to a great increase in the number of elective offices, while the prevailing idea of the impropriety of self-nominations and of a personal canvass for votes made some nominating and canvassing machinery necessary. Meetings held for this purpose received the name of caucuses. Each party held in each election district its own caucus to nominate candidates. Public notice of the time and place was given, and every voter of the party was at liberty to attend. A moderator and clerk being chosen, a nomination list was opened. Each person present nominated whom he pleased. Several copies of the list were made and distributed through the meeting, each person placing a mark against the candidate whom he proposed, and the candidate having the highest number of marks was declared the nominee. This method, however, was evidently inapplicable where the constituency was large or the district extensive. Hence the substitution of a representative caucus, delegates being appointed at meetings like that above described, held in case of cities and large towns in the wards, and in country districts in the townships. These elective caucuses commonly took to themselves the name of nominating conventions, and their introduction marks a third era in the development of the caucus system. A considerable period, however, elapsed before this convention system was applied to state or presidential nominations. The members of the state legislatures in the one case and of congress in the other, those of each party holding their own separate caucus, took upon themselves to make these nominations. At first these legislative and congressional caucuses were held privately. Afterward, however, they came to be formally and avowedly held. Committees were appointed to look after the elections, and besides a state committee the legislative caucuses assumed the power of nominating the chairmen of the local county and district conventions. At length it began to be objected that in these legislative caucuses only those districts in which the party was in the majority were represented, and this and other causes led, between 1820 and 1830, to the substitution in New York and Pennsylvania of state conventions in their place; a custom since universally imitated. Congressional caucuses about the same time fell into disfavor. That held in 1823 to nominate a successor to Monroe was but slenderly attended; and its nomination was extensively disregarded, so that Mr. Crawford, its nominee, was behind both Jackson and Adams in the popular vote. At the presidential election of 1828 Adams became the candidate of one party and Jackson of the other, without any formal nomination. The congressional caucus system being exploded, the Jackson or democratic party held in 1832 a national

nominating convention, each state being entitled to the same number of votes as in the presidential election; and similar conventions of that party have been held to nominate candidates for each succeeding presidential term. The opposition, then known as whigs, adopted the same policy in 1837, and since that period all nominations for the presidency, by whatever party or fragment of party, have been made by a similar agency. The power of assembling these bodies usually rests with a committee appointed by the previous convention. Besides judging the qualifications of their own members, and nominating candidates, they assume the power of drawing up party creeds or platforms, as they are called, and of determining, in case of new and important questions, what position the party shall take.

CAUDEBEC, a town of France, in the department of Seine-Inférieure, on the Seine, 26 m. E. of Havre; pop. in 1866, 9,184. The principal



Caudebec.

edifice is the parish church, a celebrated Gothic building in the florid style of the 15th century, with a spire 330 ft. high. It has manufactures of cotton and wool, and a brisk trade. It was formerly the capital of the Pays de Caux, but declined in consequence of the emigration of the Protestants after the revocation of the edict of Nantes. It was taken by the English in 1419, and by the Protestants in 1562. In 1592 it was besieged and taken by a Spanish force under Alexander Farnese, who received a wound beneath its walls which proved fatal.

CAUDINE FORKS (*Furculæ Caudinæ*, rarely *Furcæ Caudinæ* or *Caudinæ Fauces*), two narrow passes through the mountains of ancient Samnium, affording access from opposite sides to an enclosed plain that lay between them. Most authorities consider them to have been identical with the valley now called the Val d'Arpaja, by which passed the road from Capua to Beneventum; but this does not at all accord

with the description of Livy, and in recent works the most weighty objections have been made to the received theory of their position, several writers contending that the valley of the little river Isclero, a short distance away, is the locality described by the Roman historians. The Caudine Forks are famous for the great disaster which here overtook the Roman army under Veturius and Postumius in 321 B. C., during the Samnite war. The consuls, misled by a false report that the Samnites were besieging Luceria, an important town of northern Apulia, hurriedly broke up their camp near Calatia, and prepared to hasten across Samnium to the rescue. The nearest way led through the Caudine passes. Supposing the whole Samnite army to be in Apulia, the Romans without precaution entered the first pass, and marched through it without opposition to the plain. When they crossed this, however, and endeavored to pass out through the second de-

file on the opposite side, they found the passage blocked up with stones, trees, earth, and all manner of obstructions. Turning back, they found the gorge by which they had entered filled in the same manner. The Samnites now appeared on the surrounding heights, and the Romans understood the trap into which they had been led. With but little attempt at resistance, they surrendered. The Samnites compelled them all to submit to the disgrace of passing under the yoke (a spear resting across two others fixed upright in the ground), and took the

opportunity of this victory to force the generals to consent to terms of peace, which, although moderate and by no means humiliating, the Roman senate declared void, deciding that Veturius and Postumius had exceeded their authority in consenting to them.

CAUL (Lat. *caula*, a fold), a membrane which sometimes envelopes the head of a child when born. It is of interest only for the superstitious feelings with which it has long been regarded. The child that happened to be born with it was esteemed particularly fortunate; and the possession of it afterward, however obtained, was highly prized, as of a charm of great virtue. The superstition is thought to have come from the East; and according to Weston, in his "Moral Aphorisms from the Arabic," there are several words in that language for it. With the French, *être né coiffé* was an ancient proverb, indicative of the good fortune of the individual. The alchemists ascribed magical virtues to it;

and according to Grose, the health of the person born with it could in after life be judged of by its condition, whether dry and crisp, or relaxed and flaccid. Medicinal virtues are probably still imputed to it by the ignorant, as is the property of preserving the owner of it from drowning.

CAULAINCOURT, Armand Augustin Louis de, duke of Vicenza, a French general and diplomatist, born at Caulaincourt, near Saint-Quentin, in 1773, died in Paris, Feb. 19, 1827. His father, the marquis of Caulaincourt, was a general officer, and the son served in the army from an early age, both in the ranks, under the conscription, and as a staff officer. He was imprisoned for a time after 1792, but followed Gen. Aubert du Bayet to Constantinople in 1797, and made the campaign of 1800 under Gen. Moreau, and those of 1805, 1806, and 1807 under Napoleon. Upon the accession of the emperor Alexander in 1801, he was sent as diplomatic agent to St. Petersburg. He was afterward appointed by Napoleon grand equerry and duke of Vicenza, and in 1807 was sent as ambassador to Russia, in the place of the duke of Rovigo. Being suspected of complicity in the death of the duke d'Enghien, he was coldly received by the Russian nobility, until Alexander wrote him a letter declaratory of his innocence, and gave him special marks of personal esteem. He subsequently disapproved of the foreign policy of Napoleon, and in 1811 asked to be recalled. He also opposed the invasion of Russia. After the burning of Moscow Napoleon chose him as his companion on his flight to France. He was plenipotentiary to the allied sovereigns during the campaign of Saxony, signed the armistice of Pläswitz, June 4, 1813, and was appointed French plenipotentiary to the abortive congress of Prague. He was attached to the person of Napoleon in the campaign that followed. On April 5, 1813, he was made senator, and in September minister of foreign affairs, and in this capacity he went to the congress of Châtillon. When Napoleon seemed about to abdicate, Caulaincourt used his influence with the emperor Alexander to secure the best terms possible, and it is thought that the sovereignty of Elba was secured by his efforts. He signed the treaty of April 11, 1814, and retired to his country seat. On the return of Napoleon in 1815 he was again made minister of foreign affairs. His circular of April 3 to the French diplomats abroad represented the second accession of Napoleon in the best light, and gave assurance of respect for the rights of other nations. He took part in the deliberations of the two chambers in regard to the second abdication, and was a member of the commission of government which preceded the second return of Louis XVIII. His name was upon the list of July 24, but by the influence of the emperor Alexander it was erased. From this time his life was wholly private, except that the old accusation of complicity in the death of the duke d'Enghien was revived;

upon which he published the letter of Alexander exonerating him. This accusation weighed upon him, and he referred to it in his will, protesting his entire innocence. He left unpublished memoirs, said to be of value.

CAULIER, Madeleine, a French peasant girl who during the siege of Lille, Sept. 8, 1708, volunteered to penetrate into the city for the purpose of conveying an important order to Marshal Boufflers. She succeeded in her mission through her brother, who was a soldier in the besieged army. Though Lille was obliged to capitulate (Oct. 23), the duke of Burgundy offered her a reward, which she declined; but she was permitted at her request to enlist in a regiment of dragoons. She displayed great gallantry, and fell in the battle of Denain, July 24, 1712.

CAULIFLOWER (*brassica oleracea botrytis*, De Candolle), a cultivated plant of the cabbage tribe. It has a compact rounded head of delicate flavor, standing on a stalk 18 to 26 inches in height, and surrounded by long leaves. The leaves are not closely packed as in the cabbage.



Cauliflower.

It is more tender than the cabbage, and in transplanting should have a ball of earth lifted with the roots to secure a continuous growth. In the vicinity of New York two crops are raised in the kitchen garden in one season. If the early cauliflower does not come to perfection by the end of June, it will usually fail to head, from the excessive heat at that time. To obtain plants for this crop seeds should be sown in September in good soil, and in about four weeks transplanted to a cold frame, set two or three inches apart, and carefully protected by glass during the winter, being opened to the air only during warm days. In February they should be set into another frame, eight to twelve inches apart, to prevent a spindling growth. They should be transplanted as early in the spring as possible, at a distance of three feet from each other, and well watered and frequently hoed during the dry weather. At the time of heading, the larger leaves may be broken over the head to protect it from the sun, and the waterings should be frequent.

For a late crop the seeds are sown in an open bed in May, and the transplanting is in July. Those plants which do not head before frost may be removed to a warm shed or cellar, covered with coarse litter, and allowed to head during early winter.

CAUMONT, Aldrick Isidore Ferdinand, a French jurist and author, born at Saint Vincent-Cramesnil, May 15, 1825. Despite his poverty he studied law in Paris, and acquired eminence at Havre as a marine lawyer and professor of mercantile jurisprudence. His *Étude sur la vie et les travaux de Hugo Grotius, ou le droit naturel et le droit international* (1862), was crowned by the academy of Toulon. His principal work, consisting of over 50 separate essays, is the *Dictionnaire universel de droit commercial maritime* (1855-'69). He published in 1867 *Langue universelle de l'humanité, ou télégraphie parlée par le nombre, réduisant à l'unité tous les idiomes du globe*.

CAURA, a river of Venezuela, formed by the junction of the Yurani, Erevato, and Mareguare. It unites with the Orinoco after a N. course of about 150 m.

CAUS, or Caulx. I. Salomon de, a French engineer, born at or near Dieppe about 1576, died in Paris about 1630. Being a Protestant, he went to England about 1612. From 1614 to 1620 he resided at Heidelberg, as architect to the elector palatine Frederick V., and afterward returned to Paris. There is no historical ground for the story that he died insane in the hospital of Bicêtre. He was one of the foremost physicists of his day; but his writings long remained almost unknown until Arago called attention to them. In his work, *Les raisons des forces mouvantes* (Frankfort, 1615; Paris, 1624; also in German under the title *Von gewaltsamen Bewegungen*, Frankfort, 1615), he gave a plan of an apparatus for raising water by the power of steam. Hence Arago considers him to have been the real inventor of the steam engine. Some have imagined that the marquis of Worcester derived from Caus the idea of the apparatus vaguely described in his "Century of Inventions" (1633), and "Exact and true Definition of the most stupendous Water-commanding Engine, invented by the Right Honorable Edward Somerset, Lord Marquis of Worcester." The other works of Caus are: *La perspective, avec la raison des ombres et miroirs* (London, 1612); *Institution harmonique* (Frankfort, 1615); *Hortus Palatinus* (Heidelberg, 1620); *La pratique et démonstration des horloges solaires* (Paris, 1624). **II. Isaac de**, a relative (perhaps son) of the preceding, a native of Dieppe, was also an engineer and architect, and published among other things, *Nouvelle invention de lever l'eau plus haut que sa source* (London, 1644).

CAUSSIN DE PERCEVAL. I. Jean Jacques Antoine, a French orientalist, born at Montdidier, June 24, 1759, died July 29, 1835. He published good editions of some Arabian works, among which were "Lokman's Fables" and

the first three chapters of the Koran, and various translations of a historical or scientific character. **II. Armand Pierre**, son of the preceding, born in Paris, Jan. 13, 1795, died there in March, 1872. In 1813 he was attached to the French embassy at Constantinople to qualify himself for the post of dragoman, which he subsequently filled at Aleppo, after having explored Asia Minor, and spent a year with the Maronites on Mt. Lebanon. In 1821 he became Arabic professor at the school for modern oriental languages in Paris, and in 1833 he was installed in the chair of philology and Arabic literature at the collège de France. Besides an Arabic grammar and a revised edition of Ellious Boethor's French and Arabic dictionary, he published *Essais sur l'histoire des Arabes avant l'Islamisme, pendant l'époque de Mahomet et jusqu'à la réduction de toutes les tribus sous la loi musulmane* (3 vols. 8vo, Paris, 1847), and translations from the Turkish.

CAUSTICS (Gr. *kaleiv*, fut. *kabow*, to burn), or **Escharotics**, substances which destroy the life of the tissues upon which they act. They may be classified according to the depth and nature of their action. Nitric and hydrochloric acids, acid nitrate of mercury, nitrate of silver or lunar caustic, and sulphate of copper remove only a very superficial layer of tissue. Arsenious acid and chloride of zinc cause deeper sloughs, which require several days for their separation. The former agent may under some circumstances be absorbed and give rise to general poisoning. Caustic potassa and strong chromic acid melt down the tissues and leave but little solid slough; hence the neighboring parts should be protected during their application. The first class find a somewhat extensive application in modifying the unhealthy or specific character of an ulcerating surface, and substituting for it a condition of normal granulation. The articles of the second class are sometimes used to remove tumors, and are combined with other ingredients in various cancer cures. Though cases sometimes occur in which, for special reasons, this treatment is allowable, yet in general the knife, if properly used, possesses many advantages over it, especially in the avoidance of pain. The third class are sometimes used for similar purposes, to remove an excess of indurated tissue, or to open an abscess. Caustics are much less used than formerly in the formation of issues for purposes of counter-irritation, or for removing imaginary impurities from the system.

CAUTERETS, a watering place of France, in the department of Hautes-Pyrénées, situated in a fertile basin 3,254 feet above the sea, and enclosed by rugged mountains, 26 m. S. by W. of Tarbes. It has 22 hot sulphur springs whose temperature varies from 102° to 140°. The permanent population is about 1,300; but the number of visitors reaches 15,000 a year.

CAUTLEY, Sir Proby Thomas, an English engineer and paleontologist, born at Roydon in 1802, died at Sydenham, Jan. 25, 1871. He

was the son of a clergyman, studied at the Charterhouse, London, and at Addiscombe, entered the Bengal artillery in 1819, and served in Oude (1820-21), and at the siege of Bhurt-pore (1825-'6). He was subsequently employed in the department of public works in India, and acquired eminence by projecting and completing the Ganges canal (1848-'54). He was knighted after his return to England in 1854, became a member of the Indian council in 1858, and chairman of its committee on public works in 1859. He presented to the British museum a large collection of fossil mammalia, and wrote much on Hindoo palæontology and on kindred topics for the periodicals of scientific societies.

CAUVET, Gilles Paul, a French sculptor and architect, born at Aix, Provence, April 17, 1731, died in Paris, Nov. 15, 1788. He belonged to a rich family and was destined for the law, but indulging his taste for artistic pursuits against the wishes of his parents, he fled to Paris, where he eventually acquired professional eminence. He published in 1777 *Recueil d'ornements à l'usage des jeunes artistes qui se destinent à la décoration des bâtiments*.

CAVA, a city of Italy, in the province of Salerno, 26 m. S. E. of Naples; pop. in 1872, 19,480. It is the seat of a bishop, suffragan to the pope, and has a cathedral, several other churches, and a convent for gentlewomen. The district is unproductive, but the town flourishes by commerce and by manufactories of silk, cotton, and wool. About one mile from Cava is the celebrated Benedictine monastery of La Trinità di Cava, whose archives contain 40,000 parchment rolls and upward of 60,000 MSS. on paper, 1,600 papal diplomas and bulls, and many rare early printed books. The library also formerly contained a rich collection of MSS., but many of them have been lost or removed.

CAVAIGNAC. I. Jean Baptiste, a French revolutionist, born at Gordon in 1762, died in Brussels, March 24, 1829. In 1792 he was elected to the national convention, where he voted for the death of Louis XVI. As commissioner to the army in La Vendée, and afterward to that in the Pyrenees, he gave evidence of energy and talent. He took part with the Thermidoreans against Robespierre, and was sent on a third mission to the army of the Rhine and Moselle. On the 1st Prairial (May 20), 1795, he commanded the troops who vainly attempted to protect the convention against the insurgents. On the 13th Vendémiaire (Oct. 5) he was assistant to Barras and Bonaparte in repelling the attack by the sections. For a short time he was a member of the council of 500. In 1806 he entered the service of Joseph Bonaparte at Naples, and was continued under Murat. In 1815, during the hundred days, he was prefect of the Somme. On the second restoration, he was expelled from France as a regicide, and took up his residence in Brussels, where he lived in ob-

scurity. **II. Éléonore Louis Godefroy**, a French journalist, son of the preceding, born in Paris in 1801, died May 5, 1845. He was one of the most popular leaders of the republican party during the restoration and the reign of Louis Philippe. He distinguished himself in the revolution of July, but upon the elevation of Louis Philippe to the throne he took part in the conspiracy for the overthrow of the new dynasty, and was several times arrested and put on trial. He was one of the founders of the *société des amis du peuple*, and of the *société des droits de l'homme*. After the outbreak of April, 1834, he was arrested and sent to prison, but escaped, July 13, 1835, and retired to Belgium. In 1841 he returned to France, and became one of the editors of the *Réforme*, the most violent of the opposition journals. **III. Louis Eugène**, a French general, brother of the preceding, born in Paris, Oct. 15, 1802, died at his country seat, Château Ournes, department of Sarthe, Oct. 28, 1857. He was educated at the polytechnic school, entered the army as sub-lieutenant of engineers, took part in the French expedition to the Morea, and was appointed to a captaincy in 1829. On the revolution of 1830 he declared for the new order of things, but soon entered the *association nationale*, an organization of the opposition, in consequence of which he was for a while discharged from active service. In 1832 he was sent to Africa. Being intrusted in 1836 with the command of Tlemcen, he held this advanced fortified post for three years against the assaults of the Arabs. In 1839, his health having been impaired, he asked to be placed on leave; he was then a major. A few months later he returned to Africa, where his defence of Cherchell was no less brilliant than that of Tlemcen. In 1840 he was promoted to the colonelcy of the zouaves, and in 1844 he was made brigadier general and governor of the province of Oran. On the revolution of February, 1848, he was appointed governor general of Algeria, and promoted to the rank of general of division. The same year he was elected to the constituent assembly, and was allowed to leave Algeria to take his seat as a representative. He reached Paris two days after the disturbance of May 15, and was immediately appointed minister of war. In a few weeks 75,000 regular troops were gathered within the walls, while 190,000 national guards were ready to support them against the threatened rising of the working classes. Yet the insurrection broke out on the dissolution of the *ateliers nationaux*. On June 22 barricades were erected in the most central parts of the city. Cavaignac concentrated his troops in order finally to bear on the principal points with irresistible force. The assembly having invested him with dictatorial powers, the struggle commenced June 23, and was continued with internecine fury for 70 hours, resulting in a complete government victory. On June 29 Cavaignac resigned his dictatorship,

and the assembly unanimously elected him chief of the executive power. Several propositions, which he declined, were made in the assembly to make him president for four years without recourse to an election. The election for president took place Dec. 10; and out of 7,327,345 votes, Cavaignac received but 1,448,107. After the *coup d'état* of December, 1851, he was arrested and taken to the castle of Ham, his name being placed at the head of the list of the proscribed. Having been set at liberty, he lived for a time in retirement in Belgium, and when he returned to France resided mainly at his country seat in the department of Sarthe. In 1852 he was elected to the legislative body, but refused to take the oath of allegiance to the emperor. In 1857 he was again chosen by the electors of the third district of Paris, but again refused to take the oath. This was the last public act of his life. One morning, as he was leaving the house to visit a friend, he suddenly expired in the arms of an attendant without uttering a word.

CAVAILLON (anc. *Cabellio*), a town of Provence, France, in the department of Vaucluse, on the Durance, 14 m. S. E. of Avignon; pop. in 1866, 8,304. It has an active trade in raw silk, fruits, and preserves, and manufactories of vermicelli and madder. During the revolution its fortifications were destroyed. It was an ancient Roman town, but having been repeatedly pillaged by barbarians, and having suffered much from an earthquake in 1731, it has few remains of antiquity. The most remarkable of its ruins is a triumphal arch supposed to have belonged to the Augustan age. The country round Cavailon is justly called the garden of Provence.

CAVALCANTI, Guido, an Italian philosopher and poet, born in Florence in the early part of the 13th century, died in 1300. Dante introduces Cavalcanti's father in his *Inferno* on account of his Epicurean philosophy. Cavalcanti was distinguished for the lofty style of his poetry, which consisted for the most part of sonnets and canzonets, the most celebrated of which are those dedicated to Mandetta, a lady whom he had met at Toulouse after his return from a pilgrimage to Compostela. Having married a daughter of the Ghibelline chief Farina degli Uberti, he succeeded his father-in-law as head of that party. When the leaders of both factions were exiled by the citizens, Cavalcanti was sent to Sarzana, where his health was so much injured by the bad air, that he died soon after his return. His *Rime, edite ed inedite*, were published by Ciciapporri at Florence in 1813.

CAVALIER, Jean, a leader of the Camisards or insurgent Protestants in the Cévennes, born at Ribaute, in Languedoc, about 1679, died at Chelsea, near London, in May, 1740. The son of a poor peasant, he was first a shepherd, then a baker. Religious persecution forced him to leave his country, but after living a few months at Geneva he secretly went back, and was

foremost among the promoters of the insurrection of 1702. He was at once a preacher and a soldier, and his talents gave him an authority almost equal to that of the Camisard commander-in-chief. When Marshal Villars took the command of the royal troops, Cavalier had an interview with him at Nîmes, and agreed on terms of peace: the young chief was to be received into the king's service, with the rank of colonel and a handsome pension; a regiment was to be raised among the Camisards, who were now to enjoy the free exercise of their religion. This treaty did not suit the other chiefs or the people. Cavalier was immediately discarded by them, and departed for Paris attended by very few companions. There he was treated with contempt by the king; and having received secret advice that he was to be put in prison, he made his escape to Switzerland, whence he went to Holland. Having entered the service of England, he organized a regiment of French refugees, whom he took to Spain to support the cause of Charles. At the battle of Almanza this regiment engaged a battalion of French troops, which fought with such fury that the greatest part of both corps were left dead on the battle field. Cavalier afterward joined the army of Prince Eugene, who entered Provence and besieged Toulon. After the peace of Utrecht he repaired to England, where he was received with great favor, obtaining the rank of general, and being appointed governor of the island of Jersey.

CAVALIERI, or Cavalleri, Bonaventura, an Italian mathematician, born in Milan in 1598, died in Bologna, Dec. 3, 1647. He studied mathematics at Pisa under B. Castelli, a disciple of Galileo, officiated as professor in Bologna, and was author of several mathematical works, the most prominent of which was entitled *Geometria Indivisibilibus*, &c. Having expressed in this work some original ideas concerning the abstruse sciences, the Italians claim him to be the inventor of the infinitesimal calculus.

CAVALLI, Pietro Francesco, an Italian composer, born at Crema about 1599, died in Venice in April, 1676. His real name was Caletti-Bruni, but the governor Cavalli of Crema became his patron; and assuming his name, he became under his auspices chapelmaster of St. Mark's church at Venice. He composed *Serse*, *L'Orione*, *L'Ercole amante*, and nearly 40 other operas. According to Dr. Burney, he was the first to introduce in his opera of *Giasone* (1649) the ornamental stanza called *aria*.

CAVALLINI, Pietro, an Italian painter, born in Rome, who flourished in the early part of the 14th century. He is said to have been the disciple of Giotto, and is considered the first painter of the Roman school who was worthy of competing with the great Florentine masters. His most celebrated work, the "Crucifixion," is at Assisi. Most of his other works have perished.

CAVALLO, Tiberio, an English electrician, born in Naples in March, 1749, died in London in De-

ember, 1809. He was the son of a Neapolitan physician, completed his education in the university of his native city, and went at an early age to England with a view of becoming a merchant; but he devoted himself to natural philosophy, and gained reputation as a writer and experimenter in electricity and the physical sciences. He invented an instrument called a condenser, and another called a multiplier of electricity, and other instruments. His best work was his "Elements of Natural and Experimental Philosophy" (4 vols. 8vo, London, 1803).

CAVALRY (Fr. *cavalerie*, from *cavalier*, a horseman), a body of soldiers on horseback. The use of the horse for riding, and the introduction of bodies of mounted men into armies, naturally originated in those countries to which the horse is indigenous, and where the climate and gramineous productions of the soil favored the development of all its physical capabilities. While the horse in Europe and tropical Asia soon degenerated into a clumsy animal or an undersized pony, the breed of Arabia, Persia, Asia Minor, Egypt, and the north coast of Africa attained great beauty, speed, docility, and endurance. But it appears that at first it was used in harness only; at least in military history the war chariot long precedes the armed horseman. The Egyptian monuments show plenty of war chariots, but with a single exception no horsemen; and that exception appears to belong to the Roman period. Still it is certain that at least two centuries before the country was conquered by the Persians, the Egyptians had a numerous cavalry, and the commander of this arm is more than once named among the most important officials of the court. It is very likely that the Egyptians became acquainted with cavalry during their war with the Assyrians; for on the Assyrian monuments horsemen are often delineated, and their use in war with Assyrian armies at a very early period is established beyond a doubt. With them, also, the saddle appears to have originated. In the older sculptures the soldier rides the bare back of the animal; at a later epoch we find a kind of pad or cushion introduced, and finally a high saddle similar to that now used all over the East. The Persians and Medians, at the time they appear in history, were a nation of horsemen, though they retained the war chariot, and even left to it its ancient precedence over the newer cavalry. The cavalry of the Assyrians, Egyptians, and Persians consisted of that kind which still prevails in the East, and which up to very recent times was alone employed in northern Africa, Asia, and eastern Europe, irregular cavalry. But no sooner had the Greeks so far improved their breed of horses by crosses with the eastern horse as to fit them for cavalry purposes, than they began to organize the arm upon a new principle. They are the creators of both regular infantry and regular cavalry. They formed the masses of fighting men into distinct bodies,

armed and equipped them according to the purpose for which they were intended, and taught them to act in concert, to move in ranks and files, to keep together in a definite tactical formation, and thus to throw the weight of their concentrated and advancing mass upon a given point of the enemy's front. Thus organized, they proved everywhere superior to the undrilled, unwieldy, and uncontrolled mobs brought against them by the Asiatics. We have no instance of a combat of Grecian cavalry against Persian horsemen before the time the Persians themselves had formed bodies of a more regular kind of cavalry; but there can be no doubt that the result would have been the same as when the infantry of both nations met in battle. Cavalry, at first, was organized only by the horse-breeding countries of Greece, such as Thessaly and Bœotia; but, very soon after, the Athenians formed a body of heavy cavalry, besides mounted archers for outpost and skirmishing duty. The Spartans, too, had the *élite* of their youth formed into a body of horse guards; but they had no faith in cavalry, and made them dismount in battle and fight as infantry. This is the earliest mention made of mounted infantry, which forms so important an element in modern warfare. From the Greeks of Asia Minor, as well as from the Greek mercenaries serving in their army, the Persians learned the formation of regular cavalry, and there is no doubt that a considerable portion of the Persian horse that fought against Alexander the Great were more or less trained to act in compact bodies in a regular manner. The Macedonians, however, were more than a match for them. With that people horsemanship was an accomplishment indispensable to the young nobility, and cavalry held a high rank in their army. The cavalry of Philip and Alexander consisted of the Macedonian and Thessalian nobility, with a few squadrons recruited in central Greece. It was composed of heavy horsemen (*cataphracti*), armed with helmet and breastplate, cuisses, and a long spear. It usually charged in a compact body, in an oblong or wedge-shaped column, sometimes also in line. The light cavalry, composed of auxiliary troops, was of a more or less irregular kind, and served like the modern Cossacks for outpost duty and skirmishing.—The battle of the Granicus (334 B. C.) offers the first instance of an engagement in which cavalry played a decisive part. The Persian cavalry was placed at charging distance from the fords of the river. As soon as the heads of columns of the Macedonian infantry had passed the river, and before they could deploy, the Persian horse broke in upon them and drove them headlong down into the river. This manœuvre, repeated several times with perfect success, shows at once that the Persians had regular cavalry to oppose to the Macedonians. To surprise infantry in the very moment of its greatest weakness, that is, when passing from one tactical formation into another, requires the

cavalry to be well in hand, and perfectly under the control of its commanders. Irregular levies are incapable of it. Ptolemy, who commanded the advanced guard of Alexander's army, could make no headway until the Macedonian cuirassiers passed the river, and charged the Persians in flank. A long combat ensued, but the Persian horsemen, being disposed in one line without reserves, and being at last abandoned by the Asiatic Greeks in their army, were ultimately routed. The battle of Arbela (331 B. C.) was the most glorious for the Macedonian cavalry. Alexander in person led the Macedonian horse, which formed the extreme right of his order of battle, while the Thessalian horse formed the left. The Persians tried to outflank him, but in the decisive moment Alexander brought fresh men from the rear so as to overlap them in their turn; they at the same time left a gap between their left and centre. Into this gap Alexander at once dashed, separated their left from the remainder of the army, rolled it up completely, and pursued it for a considerable distance. Then, on being called upon to send assistance to his own menaced left, he rallied his horse in a very short time, and passing behind the enemy's centre fell upon the rear of his right. The battle was thus gained, and Alexander from that day ranks among the first of the cavalry generals of all times. And to crown the work, his cavalry pursued the fugitive enemy with such ardor that its advanced guard stood the next day 75 miles in advance of the battle field. It is very curious to observe that the general principles of cavalry tactics were as well understood at that time as they are now. To attack infantry in the formation of the march, or during a change of formation; to attack cavalry principally on its flank; to profit by any opening in the enemy's line by dashing in and wheeling to the right and left, so as to take in flank and rear the troops placed next to such a gap; to follow up a victory by a rapid and inexorable pursuit of the broken enemy—these are among the first and most important rules that every cavalry officer has to learn. After Alexander's death we hear no more of that splendid cavalry of Greece and Macedon. In Greece infantry again prevailed, and in Asia and Egypt the mounted service soon degenerated.—The Romans never were horsemen. What little cavalry they had with the legions was glad to fight on foot. Their horses were of an inferior breed, and the men could not ride. But on the southern side of the Mediterranean a cavalry was formed, which not only rivalled, but even outshone that of Alexander. The Carthaginian generals, Hamilcar and Hannibal, had succeeded in forming, besides their Numidian irregular horsemen, a body of first-rate regular cavalry, and thus created an arm which almost everywhere insured them victory. The Berbers of north Africa are still a nation of horsemen, at least in the plains, and the splendid Barb horse which carried Hannibal's swordsmen

into the deep masses of the Roman infantry, with a rapidity and vehemence unknown before, still mounts the finest regiments of the whole French cavalry, the *chasseurs d'Afrique*, and is by them acknowledged to be the best war horse in existence. The Carthaginian infantry was far inferior to that of the Romans, even after it had been long trained by its two great chiefs; it would not have had the slightest chance against the Roman legions, had it not been for the assistance of that cavalry which alone made it possible for Hannibal to hold out 16 years in Italy; and when this cavalry had been worn out by the wear and tear of so many campaigns, not by the sword of the enemy, there was no longer a place in Italy for him. Hannibal's battles have that in common with those of Frederick the Great, that most of them were won by cavalry over first-rate infantry; and, indeed, at no other time has cavalry performed such glorious deeds as under those two great commanders. From what nation, and upon what tactical principles, Hamilcar and Hannibal formed their regular cavalry, we are not precisely informed. But as their Numidian light horse are always clearly distinguished from the heavy or regular cavalry, we may conclude that the latter was not composed of Berber tribes. There were very likely many foreign mercenaries and some Carthaginians; the great mass, however, most probably consisted of Spaniards, as it was formed in their country, and as even in Cæsar's time Spanish horsemen were attached to most Roman armies. Hannibal being well acquainted with Greek civilization, and Greek mercenaries and soldiers of fortune having before his time served under the Carthaginian standards, there can scarcely be a doubt that the organization of the Grecian and Macedonian heavy cavalry served as the basis for that of the Carthaginian. The very first encounter in Italy settled the question of the superiority of the Carthaginian horse. At the Ticinus (218 B. C.), the Roman consul Publius Scipio, while reconnoitering with his cavalry and light infantry, met with the Carthaginian cavalry led by Hannibal on a similar errand. Hannibal at once attacked. The Roman light infantry stood in first line, the cavalry formed the second. The Carthaginian heavy horse charged the infantry, dispersed it, and then fell at once on the Roman cavalry in front, while the Numidian irregulars charged their flank and rear. The battle was short. The Romans fought bravely, but they had no chance whatever. They could not ride; their own horses vanquished them; frightened by the flight of the Roman skirmishers, who were driven in upon them and sought shelter between them, they threw off many of their riders and broke up the formation. Other troopers, not trusting to their horsemanship, wisely dismounted and attempted to fight as infantry. But already the Carthaginian cuirassiers were in the midst of them, while the inevitable Numidians galloped round the confused mass, cutting down

every fugitive who detached himself from it. The loss of the Romans was considerable, and Publius Scipio himself was wounded. At the Trebia, Hannibal succeeded in enticing the Romans to cross that river, so as to fight with this barrier in their rear. No sooner was this accomplished than he advanced with all his troops against them and forced them to battle. The Romans, like the Carthaginians, had their infantry in the centre; but opposite to the wings of the Roman army, formed by cavalry, Hannibal placed his elephants, making use of his cavalry to outflank and overlap both wings of his opponents. At the very outset of the battle, the Roman cavalry, thus turned and outnumbered, was completely defeated; but the Roman infantry drove back the Carthaginian centre and gained ground. The victorious Carthaginian horse now attacked them in front and flank; they compelled them to desist from advancing, but could not break them. Hannibal, however, knowing the solidity of the Roman legion, had sent 1,000 horsemen and 1,000 picked foot soldiers under his brother Mago by a roundabout way to their rear. These fresh troops now fell upon them and succeeded in breaking the second line; but the first line, 10,000 men, closed up, and in a compact body forced their way through the enemy, and marched down the river toward Placentia, where they crossed it unmolested. In the battle of Cannæ (216 B. C.), the Romans had 80,000 infantry and 6,000 cavalry; the Carthaginians, 40,000 infantry and 10,000 cavalry. The cavalry of Latium formed the Roman right wing, leaning on the river Aufidus; that of the allied Italians stood on the left, while the infantry formed the centre. Hannibal, too, placed his infantry in the centre, the Gallic and Spanish levies again forming the wings, while between them, a little further back, stood his African infantry, now equipped and organized on the Roman system. Of his cavalry, he placed the Numidians on the right wing, where the open plain permitted them, by their superior mobility and rapidity, to evade the charges of the Italian heavy horse opposed to them; while the whole of the heavy cavalry, under Hasdrubal, was stationed on the left, close to the river. On the Roman left, the Numidians gave the Italian cavalry plenty to do. In the centre, the Roman infantry soon drove back the Gauls and Spaniards, and then formed into a wedge-shaped column in order to attack the African infantry. These, however, wheeled inward, and charging the compact infantry in line, broke its impetus; and there the battle now became a standing fight. But Hasdrubal's heavy horse had in the mean time prepared the defeat of the Romans. Having furiously charged the Roman cavalry of the right wing, they dispersed them after a stout resistance, passed, like Alexander at Arbela, behind the Roman centre, fell upon the rear of the Italian cavalry, broke it completely, and, leaving it an easy prey to the Numidians, formed for a grand charge

on the flanks and rear of the Roman infantry. This was decisive. The unwieldy mass, attacked on all sides, gave way, opened out, was broken, and succumbed. Never was there such complete destruction of an army. The Romans lost 70,000 men; of their cavalry, only 70 men escaped. The Carthaginians lost not quite 6,000, three eighths of whom belonged to the Gallic contingents, which had to bear the brunt of the first attack of the legions. Of Hasdrubal's 6,000 regular horse, which had won the whole of the battle, not more than 200 men were killed and wounded. The Roman cavalry of later times was not much better than that of the Punic wars. It was attached to the legions in small bodies, never forming an independent arm. Besides this legionary cavalry, there were in Cæsar's time Spanish, Gallic, and German mercenary horsemen, all of them more or less irregular. No cavalry serving with the Romans ever performed anything worthy of mention; and so neglected and ineffective was this arm, that the Parthian irregulars of Khorasan remained extremely formidable to Roman armies. In the eastern half of the empire, however, the ancient passion for horses and horsemanship retained its sway; and Byzantium remained, up to its conquest by the Turks, the great horse mart and riding academy of Europe. Accordingly, we find that during the momentary revival of the Byzantine empire under Justinian, its cavalry was on a comparatively respectable footing; and in the battle of Capua, in A. D. 552, the eunuch Narses is reported to have defeated the Teutonic invaders of Italy principally by means of this arm.—The establishment, in all countries of western Europe, of a conquering aristocracy of Teutonic origin, led to a new era in the history of cavalry. The nobility took everywhere to the mounted service, under the designation of men-at-arms, forming a body of horse of the heaviest description, in which not only the riders but also the horses were covered with defensive armor. The first battle at which such cavalry appeared was that of Poitiers (732), where Charles Martel beat back the torrent of Arab invasion. The Frankish knighthood, under Eudes, duke of Aquitania, broke through the Moorish ranks and took their camp. But such a body was not fit for pursuit; and the Arabs accordingly, under shelter of their indefatigable irregular horse, retired unmolested into Spain. From this battle dates a series of wars in which the massive but unwieldy regular cavalry of the West fought the agile irregulars of the East with varied success. The German knighthood measured swords, during nearly the whole of the 10th century, with the wild Hungarian horsemen, and totally defeated them by their close array at Merseburg in 933, and at the Lech in 955. The Spanish chivalry for several centuries fought the Moorish invaders of their country, and ultimately conquered them. But when the occidental "heavies" transferred the

seat of war during the crusades to the eastern homes of their enemies, they were in their turn defeated, and in most cases completely destroyed; neither they nor their horses could stand the climate, the immensely long marches, and the want of proper food and forage. These crusades were followed by a fresh irruption of eastern horsemen into Europe, that of the Mongols, who, under the leadership of the great khans, organized cavalry armies numbering according to Marco Polo as many as 300,000 men. Having overrun Russia and the provinces of Poland, they were met at Wahlstadt in Silesia, in 1241, by a combined Polish and German army. After a long struggle, the Asiatics defeated the worn-out steel-clad knights, but the victory was so dearly bought that it broke the power of the invaders. The Mongols advanced no further, and soon, by divisions among themselves, ceased to be dangerous, and were driven back. During the whole of the middle ages cavalry remained the chief arm of all armies; with the eastern nations the light irregular horse had always held that rank; with those of western Europe, the heavy regular cavalry formed by the knighthood was in this period the arm which decided every battle. This preëminence of the mounted arm was not so much caused by its own excellence, for the irregulars of the East were incapable of orderly fight, and the regulars of the West were incredibly clumsy in their movements; it was principally caused by the bad quality of the infantry. Asiatics as well as Europeans held that arm in contempt; it was composed of those who could not afford to appear mounted, principally of slaves or serfs. There was no proper organization for it; without defensive armor, with a pike and sword for its sole weapons, it might now and then by its deep formation withstand the furious but disorderly charges of eastern horsemen; but it was easily ridden over by the invulnerable men-at-arms of the West. The only exception was formed by the English infantry, which derived its strength from its formidable weapon, the long-bow. The numerical proportion of the European cavalry of these times to the remainder of the army was certainly not as great as it was a few centuries later, nor even as it is now. Knights were not so exceedingly numerous, and in many large battles we find that not more than 800 or 1,000 of them were present. But they were generally sufficient to dispose of any number of foot soldiers, as soon as they had succeeded in driving from the field the enemy's men-at-arms. The general mode of fighting of these men-at-arms was in line, in single rank, the rear rank being formed by the esquires, who usually wore a less complete and heavy suit of armor. These lines, once in the midst of the enemy, soon dissolved themselves into single combatants, and finished the battle by sheer hand-to-hand fighting. Subsequently, when firearms began to come into use, deep masses were formed, generally squares; but then the

days of chivalry were numbered. During the 15th century, not only was artillery generally introduced into the field of battle, while part of the infantry, the skirmishers of those times, were armed with muskets, but a general change took place in the character of the infantry. This arm began to be formed by the enlistment of mercenaries who made war a profession. The German *Landsknechte* and the Swiss were such professional soldiers, and they very soon introduced more regular formations and tactical movements. The ancient Doric and Macedonian phalanx was in a manner revived; a helmet and a breastplate somewhat protected the men against the lance and sword of the cavalry; and when, at Novara (1513), the Swiss infantry drove the French knighthood from the field, there was no further use for such valiant but unwieldy horsemen. Accordingly, after the insurrection of the Netherlands against Spain, we find a new class of cavalry, the German *Reiter* (*reitres* of the French), raised by voluntary enlistment, like the infantry, and armed with helmet and breastplate, sword and pistols. They were fully as heavy as the modern cuirassiers, yet far lighter than the knights. They soon proved their superiority over the heavy men-at-arms. These now disappear, and with them the lance; the sword and short firearms now form the general armature for cavalry. About the same time (end of the 16th century) the hybrid arm of dragoons was introduced, first in France, then in the other countries of Europe. Armed with muskets, they were intended to fight, according to circumstances, either as infantry or as cavalry. A similar corps had been formed by Alexander the Great under the name of *dimacha*, but it had not yet been imitated. The dragoons of the 16th century had a longer existence, but toward the middle of the 18th century they had everywhere lost their hybrid character, except in name, and were generally used as cavalry. The most important feature in their formation was that they were the first body of regular cavalry which was completely deprived of defensive armor. The creation of real hybrid dragoons was again attempted, on a large scale, by the emperor Nicholas of Russia; but it was soon proved that before the enemy they must always be used as cavalry, and consequently Alexander II. very soon reduced them to simple cavalry, with no more pretensions to dismounted service than hussars or cuirassiers. Maurice of Orange, the great Dutch commander, formed his reiters for the first time in something like our modern tactical organization. He taught them to execute charges and evolutions in separate bodies, and in more than one line; to wheel, break off, form column and line, and change front, without disorder, and in separate squadrons and troops. Thus a cavalry fight was no longer decided by one charge of the whole mass, but by the successive charges of separate squadrons and lines supporting each

other. His cavalry was formed generally five deep. In other armies it fought in deep bodies, and where a line formation was adopted it was still from five to eight deep. The 17th century, having completely done away with the costly men-at-arms, increased the numerical strength of cavalry to an enormous extent. At no other period was there so large a proportion of that arm in every army. In the thirty years' war from two fifths to nearly one half of each army was generally composed of cavalry; in single instances there were two horsemen to one foot soldier. Gustavus Adolphus stands at the head of cavalry commanders of this period. His mounted troops consisted of cuirassiers and dragoons, the latter fighting almost always as cavalry. His cuirassiers, too, were much lighter than those of the emperor, and soon proved their incontestable superiority. The Swedish cavalry were formed three deep; their orders were, contrary to the usage of the cuirassiers of most armies, whose chief arm was the pistol, not to lose time in firing, but to charge the enemy sword in hand. At this period the cavalry, which during the middle ages had generally been placed in the centre, was again placed, as in antiquity, on the wings of the army, where it was formed in two lines. In England, the civil war gave rise to two distinguished cavalry leaders. Prince Rupert, on the royalist side, had as much "dash" in him as any cavalry general, but he was almost always carried too far, lost his cavalry out of hand, and was himself so taken up with what was immediately before him, that the general always disappeared in the "bold dragoon." Cromwell, on the other hand, with quite as much dash where it was required, was a far better general; he kept his men well in hand, always held back a reserve for unforeseen events and decisive movements, knew how to manoeuvre, and thus proved generally victorious over his more inconsiderate opponent. He won the battles of Marston Moor and Naseby by his cavalry alone.—With most armies the use of the firearm still remained the chief employment of cavalry in battle, the Swedes and English alone excepted. In France, Prussia, and Austria, cavalry was drilled to use the carbine exactly as infantry used the musket. They fired on horseback, the line standing still all the while, by files, platoons, ranks, &c.; and when a movement for a charge was made, the line advanced at a trot, pulled up at a short distance from the enemy, gave a volley, drew swords, and then charged. The effective fire of the long lines of infantry had shaken all confidence in the charge of a cavalry which was no longer protected by armor; consequently, riding was neglected, no movements could be executed at a quick pace, and even at a slow pace frequent accidents happened to both men and horses. The drill was mostly dismounted work, and their officers had no idea whatever of the way of handling cavalry in battle. The French, it is true, sometimes charged sword in hand, and

Charles XII. of Sweden, true to his national tradition, always charged full speed without firing, dispersing cavalry and infantry, and sometimes even taking field works of a weak profile. But it was reserved for Frederick the Great and his great cavalry commander, Seydlitz, to revolutionize the mounted service, and to raise it to the culminating point of glory. The Prussian cavalry, heavy men on clumsy horses, drilled for firing only, such as Frederick's father had left them to his son, were beaten in an instant at Mollwitz (1741). But no sooner was the first Silesian war brought to a close than Frederick entirely reorganized his cavalry. Firing and dismounted drill were thrown into the background, and riding was attended to. "All evolutions are to be made with the greatest speed, all wheels to be done at a canter. Cavalry officers must above all things form the men into perfect riders; the cuirassiers to be as handy and expert on horseback as a hussar, and well exercised in the use of the sword." The men were to ride every day. Riding in difficult ground, across obstacles, and fencing on horseback, were the principal drills. In a charge, no firing at all was allowed until the first and second lines of the enemy were completely broken. "Every squadron, as it advances to the charge, is to attack the enemy sword in hand, and no commander shall be allowed to let his troops fire under penalty of infamous cashiering; the generals of brigades to be answerable for this. As they advance, they first fall into a quick trot, and finally into a full gallop, but well closed; and if they attack in this way, his majesty is certain that the enemy will always be broken." "Every officer of cavalry will have always present to his mind that there are but two things required to beat the enemy: 1, to charge him with the greatest possible speed and force; and, 2, to outflank him." These passages from Frederick's instructions sufficiently show the total revolution he carried out in cavalry tactics. He was seconded admirably by Seydlitz, who always commanded his cuirassiers and dragoons, and made such troops of them that for vehemence and order of charge, quickness of evolutions, readiness for flank attacks, and rapidity in rallying and reforming after a charge, no cavalry has ever equalled the Prussian cavalry of the seven years' war. The fruits were soon visible. At Hohenfriedberg the Baireuth regiment of dragoons, 10 squadrons, rode down the whole left wing of the Austrian infantry, broke 21 battalions, took 66 stand of colors, 5 guns, and 4,000 prisoners. At Zorndorf, when the Prussian infantry had been forced to retreat, Seydlitz, with 36 squadrons, drove the victorious Russian cavalry from the field, and then fell upon the Russian infantry, completely defeating it with great slaughter. At Rossbach, Striegau, Kesselsdorf, Leuthen, and in ten other battles, Frederick owed the victory to his splendid cavalry.—When the French revolutionary war broke out, the Austrians had adopted the Prussian system,

but not so the French. The cavalry of the latter nation had, indeed, been much disorganized by the revolution, and in the beginning of the war the new formations proved almost useless. When their new infantry levies were met by the good cavalry of the English, Prussians, and Austrians, they were, during 1792 and 1793, almost uniformly beaten. The cavalry, quite unable to cope with such opponents, was always kept in reserve until a few years' campaigning had improved them. In 1796 and afterward every division of infantry had cavalry as a support; still, at Würzburg, the whole of the French cavalry was defeated by 59 Austrian squadrons (1796). When Napoleon took the direction of affairs in France, he did his best to improve the French cavalry. He found about the worst material that could be met with. As a nation, the French were the worst horsemen of Europe, and their horses, good for draught, were not well adapted for the saddle. He made great improvements, and after the camp of Boulogne his cavalry, in great part mounted on German and Italian horses, was no despicable adversary. The campaigns of 1805 and 1806-'7 allowed his cavalry to absorb almost all the horses of the Austrian and Prussian armies, and moreover reënforced the French army by the excellent cavalry of the confederation of the Rhine and the duchy of Warsaw. Thus were formed those enormous masses of horsemen with which Napoleon acted in 1809, 1812, and the latter part of 1813, which, though generally designated as French, were in great part composed of Germans and Poles. The cuirass, which had been entirely done away with in the French army shortly before the revolution, was restored to a portion of the heavy cavalry by Napoleon. In other respects the organization and equipment remained nearly the same, except that with his Polish auxiliaries he received some regiments of light horse, armed with the lance, the costume and equipment of which were soon imitated in other armies. But in the tactical use of cavalry he introduced a complete change. According to the system of composing divisions and army corps of all three arms, a portion of the light cavalry was attached to each division or corps; but the mass of the arm, and especially all the heavy horse, were held together in reserve for the purpose of striking at a favorable moment a great decisive blow, or, in case of need, of covering the retreat of the army. These masses of cavalry, suddenly appearing on a given point of the battle field, have often acted decisively; still they never gained such brilliant successes as the horsemen of Frederick the Great. The cause of this is to be looked for partly in the changed tactics of infantry, which, by selecting chiefly broken ground for its operations, and always receiving cavalry in a square, made it more difficult for the latter arm to achieve such great victories as the Prussian horsemen had obtained over the long, thin infantry lines of their opponents.

But it is also certain that Napoleon's cavalry was not equal to that of Frederick the Great, and that Napoleon's cavalry tactics were not in every instance an improvement upon those of Frederick. The indifferent riding of the French compelled them to charge at a comparatively slow pace, at a trot or a collected canter; there are but few instances where they charged at a gallop. Their great bravery and close ranks made up often enough for the curtailed impetus, but still their charge was not what would now be considered good. The old system of receiving hostile cavalry standing, carbine in hand, was in very many cases retained by the French cavalry, and in every such instance were they defeated. The last example of this happened at Danigkow, April 5, 1813, where about 1,200 French cavalry thus awaited a charge of 400 Prussians, and were completely beaten in spite of their numbers. As to Napoleon's tactics, the use of great masses of cavalry with him became such a fixed rule, that not only was the divisional cavalry weakened so as to be completely useless, but also in the employment of these masses he often neglected that successive engagement of his forces which is one of the principal points in modern tactics, and which is even more applicable to cavalry than to infantry. He introduced the cavalry charge in column, and even formed whole cavalry corps into one monster column, in such formations that the extrication of a single squadron or regiment became an utter impossibility, and that any attempt at deploying was entirely out of the question. His cavalry generals, too, were not up to the mark, and even the most brilliant of them, Murat, would have cut but a sorry figure if opposed to a Seydlitz. During the wars of 1813, '14, and '15, cavalry tactics had decidedly improved on the part of Napoleon's opponents. Though to a great extent following Napoleon's system of holding cavalry in reserve in large masses, and therefore very often keeping the greater portion of the cavalry entirely out of an action, still in many instances a return to the tactics of Frederick was attempted. In the Prussian army the old spirit was revived. Blücher was the first to use his cavalry more boldly, and generally with success. The ambuscade of Haynau (1813), where 20 Prussian squadrons rode down 8 French battalions and took 18 guns, marks a turning point in the modern history of cavalry, and forms a favorable contrast to the tactics of Lützen, where the allies held 18,000 horse entirely in reserve until the battle was lost, although a more favorable cavalry ground could not be found. The English had never adopted the system of forming large masses of cavalry, and had therefore many successes, although Napier himself admits that their cavalry was not so good at that time as that of the French. At Waterloo, where the French cuirassiers for once charged at full speed, the English cavalry was admirably handled and generally successful, except where it followed

its national weakness of getting out of hand. Since the peace of 1815, Napoleon's tactics, though still preserved in the regulations of most armies, have again made room for those of Frederick.—Noticeable advancement in the proper organization and use of cavalry was made in the United States during the civil war, the men of both armies, as well as the horses of all sections, being admirably adapted to this branch of the military service. At first the confederate cavalry had the advantage both in organization and commanders, and yet took no very important part in the battles which were fought. A large number of cavalry regiments were organized by both armies, but being composed of men almost entirely ignorant of military life, they were at first used for scouts, orderlies, and outpost service, and were attached to corps, and in some cases to divisions of infantry. Gen. Hooker, while in command of the army of the Potomac, collected the cavalry into a corps, and made an effort to use it in connection with the infantry in battle, but met with no success worthy of record. In the west the practice and result were similar, but attention was drawn to the cavalry by the successful march of a small brigade of horse under Col. Grierson from the neighborhood of Memphis, through Mississippi, to Port Gibson. But the first successful organization of the cavalry was made under the direction of Gen. Grant, by Gen. Sheridan, who was placed in command of all the mounted troops serving with the army of the Potomac. This organization was known as the cavalry corps of the army of the Potomac, and consisted of three divisions each about 5,000 strong, or of two or three brigades of three or four regiments each. They were mostly armed with repeating carbines and sabres, and habitually fought on foot, though they showed a partiality for charging with the sabre when opportunity offered. Up to this period of the war (the spring of 1864) the improvements in the organization and use of cavalry kept even pace with each other in the contending armies; but Gen. Grant having detached Sheridan with his entire force after the battle of Spottsylvania Court House, the latter met and defeated the confederate cavalry at Yellow Tavern, near Richmond, killing their leader, Gen. Stewart, and ever after, till the termination of the war, retained his superiority over his opponents, increased the efficiency of his own troops, and made them an important portion of the army, taking an essential part in all the campaigns and battles. The battle of the Opequan, near Winchester, in which Sheridan defeated Early, was begun and ended by the cavalry, Wilson's division having broken through the enemy's picket line and under cover of darkness secured the position upon which the battle was mainly fought, while Merritt's division, later in the day, turned the enemy's right, and, aided by the advance of the infantry, swept the confederate infantry from the field. The part taken by the cavalry in the final battles

near Petersburg, and especially at Five Forks, and in the capture of the confederate army near Appomattox Court House, was no less conspicuous and important. The western armies had with them a large number of mounted regiments, which were organized at various times into brigades and divisions, but none of the commanding generals seemed to appreciate their value, or to know how to use them effectively. Sherman made several efforts to concentrate the mounted regiments and to give them a coherent organization, but met with nothing but disappointment, till Gen. Grant sent Gen. Wilson to take the place of chief of cavalry. Sherman gave this officer a *carte blanche*, and put him in command of 72 regiments (each nominally 1,200 strong), comprising all the cavalry and mounted infantry of the armies of the Ohio, Cumberland, and Tennessee. Gen. Wilson organized these regiments, after mustering out and disbanding a number, into seven divisions, mostly of two brigades each, forming a corps designated as the cavalry corps of the military division of the Mississippi. At the time of its organization (on paper), in October, 1864, the troops constituting it were scattered from Gaylesville, Alabama, to the Big Blue river in Missouri, and were mostly dismounted. They had worn out their horses by hard usage, and the war department had so little confidence in the utility of this arm of service, that it made but feeble efforts to furnish horses for a remount, so long as they were to be used as they had been heretofore. The success of Sheridan in the army of the Potomac, however, gave renewed confidence, and the war department made extraordinary efforts to secure horses. The secretary of war authorized the cavalry to seize and impress horses wherever they could be found. Meanwhile Sherman had marched toward the sea, and Hood had invaded Tennessee, and pressed back the forces of Gen. Schofield to Franklin, where a stand was made, and a decided victory gained both by the infantry and cavalry over the corresponding arms under Hood and Chalmers. During the 15 days of the siege of Nashville Wilson increased his effective mounted force, by the impressment of horses and the use of remounts forwarded from the north, from 5,000 to 15,000. At the battle of Nashville, on the 15th and 16th of December, he had 12,000 mounted cavalry and infantry, besides 3,000 dismounted men, and a detached force of 3,000 men operating in Kentucky. During the first day's operations he turned the left wing of Hood's army, capturing 16 guns and many prisoners, and on the second day continued his operations upon the left wing and rear of the enemy, pressing them by repeated charges of his dismounted horsemen under Hatch, Coon, and Hammond, till Hood sent word to Chalmers, "For God's sake drive the Yankee cavalry from our left and rear, or all is lost." But Chalmers failed, and by nightfall the confederate army was broken, scattered, and in full retreat. The cavalry pursued with vigor,

and, notwithstanding the swollen streams and wintry weather, did not relinquish the chase till the remnant of Hood's army had crossed the Tennessee river. Wilson's corps went into cantonments on the banks of the river, below the Muscle shoals at the head of navigation, early in January, about 7,000 effectives. During the next six weeks the number was increased to 27,000 men, 17,000 of whom were mounted and thoroughly equipped. This did not include Kilpatrick's division, then detached with Sherman. A system of drills and instruction was instituted, the single-rank formation prescribed by the new tactics was discarded, and the double-rank adopted, as being better calculated for manœuvring so large a command in a thickly wooded country. After detaching one division of 5,000 men to join Canby in Louisiana, and leaving another in camp dismounted, 8,000 strong, Wilson marched from Eastport toward Selma on the 22d of March with nearly 15,000 men, 12,000 of whom were well mounted, and 3,000 dismounted. All of these men, except about 1,200, were armed with the Spencer magazine carbines or rifles. On the 2d day of April they arrived in front of Selma, having met and defeated a part of Forrest's cavalry the day before. This place, although strongly fortified by a continuous line of earthworks and stockades, and defended by 32 guns and nearly 8,000 men, composed about equally of regular troops and militia, was assaulted and captured, the principal attacking force consisting of 1,550 men and officers. After bridging the Alabama river, this corps marched rapidly through Montgomery toward Macon, Georgia, capturing on the way West Point and Columbus, the former by assault during the daytime, and the latter by a night attack conducted under the immediate supervision of Generals Upton and Winslow. On April 20 it reached Macon, where it was arrested by the termination of the war. Up to this time it had subsisted upon the country, marched 525 miles in 28 days, captured 6,820 prisoners and 280 guns, and destroyed two gunboats, 99,000 stands of small arms, 235,000 bales of cotton, and all the mills, collieries, iron works, factories, railroad bridges, rolling stock, and military establishments which were found on the line of march. The lessons taught by the operations of the national cavalry during the closing events of the civil war are not new, but they seem to have been neglected by the European commanders of the present time. They are, that cavalry should constitute a large part of the army in time of war, and be so organized, mounted, equipped, and directed as to act with vigor and celerity upon the flanks, rear, and communications of the enemy. It should be armed with magazine rifles and carbines, using cartridges with metallic cases, march with great rapidity, at the rate of 40 or 50 miles per day, and fight generally dismounted like light infantry. It should usually subsist upon the enemy's country, and on long marches, or in the presence of the enemy, have no trains except

for the purpose of carrying extra ammunition. It should be kept in large bodies and be used mainly for great purposes. Properly handled and organized, it is capable of doing almost all the services of infantry, besides marching with twice or thrice their rapidity.—In modern European armies riding is better attended to than formerly, though still not at all to the extent it should be. The idea of receiving the enemy carbine in hand is scouted; Frederick's rule is everywhere revived, that every cavalry commander who allows the enemy to charge him, instead of charging himself, deserves to be cashiered. The gallop is again the pace of the charge; and the column attack has made way for charges in successive lines, with dispositions for flank attack, and with a possibility of manœuvring with single detachments during the charge. Still much remains to be done before the European cavalry can claim to have caught the spirit of the American improvement in the use of this great arm. The cavalry took but a comparatively insignificant part in the last great wars between Prussia and Austria and between Prussia and France. It may be said that neither of the combatants showed any appreciation of the immense advantages to be gained by using mounted troops in masses, upon the flank and rear of the enemy.—From the history of cavalry let us now turn to its present organization and tactics. The recruiting of cavalry, as far as the men are concerned, is not different upon the whole from the way the other arms recruit themselves in each country. In some states, however, the natives of particular districts are destined to this service; thus in Russia, the Malorussians (natives of Little Russia); in Prussia, the Poles. In Austria, the heavy cavalry is recruited in Bohemia, the hussars exclusively in Hungary, and the lancers (ulans) mostly in Galicia. The recruiting of the horses, however, deserves especial notice. In England, where the whole cavalry does not require in time of war above 10,000 horses, the government finds no difficulty in buying them; but in order to insure to the service the benefit of horses not worked till nearly five years old, three-year-old colts, mostly Yorkshire bred, are bought and kept at government expense in depots till they are fit to be used. The price paid for the colts (£20 to £25), and the abundance of good horses in the country, make the British cavalry certainly the best mounted in the world. In Russia a similar abundance of horses exists, though the breed is inferior to the English. The remount officers buy the horses by wholesale in the southern and western provinces of the empire; they resell those that are unfit, and hand over to the various regiments such as are of its color (all horses being of the same color in a Russian regiment). The colonel is considered as it were proprietor of the horses; for a round sum paid to him he has to keep the regiment well mounted. The horses are expected to last eight years. Formerly they were

taken from the large breeding establishments of Volhynia and the Ukraine, where they are quite wild; but breaking them for cavalry purposes was so difficult that it had to be given up. In Austria the horses are partly bought, but the greater portion have of late been furnished by the government breeding establishments, which can part every year with above 5,000 five-year-old cavalry horses. For a case of extraordinary effort, a country so rich in horses as Austria can rely upon the markets of the interior. Prussia at the beginning of the century had to buy almost all her horses abroad, but now can mount the whole of her cavalry, line and landwehr, in the interior. For the line, the horses are bought at three years old, by remount commissaries, and sent into depots until old enough for service; 3,500 are required every year. In case of mobilization of the landwehr cavalry, all horses in the country, like the men, are liable to be taken for service; a compensation of from \$40 to \$70 is however paid for them. There are three times more serviceable horses in the country than can be required. France, of all European countries, is the worst off for horses. The breed, though often good and even excellent for draught, is generally unfit for the saddle. Government breeding studs (*haras*) have been long established, but not with the success they have had elsewhere. Though the depots and studs have been much improved, they are still insufficient to fully supply the army. Algeria furnishes a splendid breed of cavalry horses, and the best regiments of the service, the *chasseurs d'Afrique*, are exclusively mounted with them, but the other regiments scarcely get any. Thus, in case of a mobilization, the French are compelled to buy abroad.—Cavalry is essentially of two kinds: heavy and light. The real distinctive character of the two is in the horses. Large and powerful horses cannot well work together with small, active, and quick ones. The former in a charge act less rapidly, but with greater weight; the latter act more by the speed and impetuosity of the attack, and are moreover far more fit for single combat and skirmishing, for which heavy or large horses are neither handy nor intelligent enough. Thus far the distinction is necessary; but fashion, fancy, and the imitation of certain national costumes, have created numerous subdivisions and varieties, to notice which in detail would be of no interest. The heavy cavalry, at least in part, is in most countries furnished with a cuirass, which, however, is far from being shot-proof. Light cavalry is partly armed with the sword and carbine, partly with the lance. The carbine is now generally rifled. Pistols are added in most cases to the armature of the rider; the United States cavalry alone carries the revolver. The sword is either straight, or curved to a greater or less degree; the first preferable for thrusts, the second for cuts. The question as to the advantages of the lance over the sword is still under discussion. For close encounter

the sword is undoubtedly preferable; and in a charge the lance, unless too long and heavy to be easily wielded, can scarcely act at all, but in the pursuit of broken cavalry it is most effective. Of nations of horsemen, almost all trust to the sword; even the Cossack abandoned his lance when he had to fight against the expert swordsmen of Circassia. The carbine is very effective if rifled, and more so if it is a breech-loading one furnished with a magazine; the revolver in skilful hands is a formidable weapon for close encounter.—Besides the saddle, bridle, and armed rider, the cavalry horse has to carry a valise with reserve clothing, camp utensils, grooming tackle, and in a campaign also food for the rider and forage for itself. The sum total of this burden varies in different services and classes of cavalry, between 250 and 300 lbs. for the heavy marching order, a weight which will appear enormous when compared with what private saddle horses have to carry. This overweighting of horses is the weakest point of all cavalry. Great reforms are everywhere required in this respect. The weight of the men and accoutrements can and must be reduced; but as long as the present system lasts, this drag upon the horses is always to be taken into account whenever we judge of the capabilities of exertion and endurance of cavalry. Heavy cavalry, composed of strong but, if possible, comparatively light men, on strong horses, must act principally by the force of a well closed, solid charge. This requires power, endurance, and a certain physical weight, though not as much as would render it unwieldy. There must be speed in its movements, but no more than is compatible with the highest degree of order. Once formed for the attack, it must chiefly ride straight forward; but whatever comes in its path must be swept away by its charge. The riders need not be individually as good horsemen as those of light cavalry; but they must have full command over their horses, and be accustomed to ride straight forward and in a well closed mass. Their horses, in consequence, must be less sensible to the leg, nor should they have their haunches too much under them; they should step out well in their trot, and be accustomed to keep well together in a good, long hand gallop. Light cavalry, on the contrary, with nimbler men and quicker horses, has to act by its rapidity and ubiquity. What it lacks in weight must be made up by speed and activity. It will charge with the greatest vehemence; but when preferable, it will seemingly fly in order to fall upon the enemy's flank, by a sudden change of front. Its superior speed and fitness for single combat render it peculiarly fit for pursuit. Its chiefs require a quicker eye and a greater presence of mind than those of heavy horse. The men must be individually better horsemen; they must have their horses perfectly under control, start from a stand into a full gallop, and again stop in an instant; turn quick, and leap well;

the horses should be hardy and quick, light in the mouth, and obedient to the leg, handy at turning, and especially broken for working at a canter, having their haunches well under them. Besides rapid flank and rear attacks, ambuscades, and pursuit, the light cavalry has to do the greater part of the outpost and patrolling duty for the whole army; aptness for single combat, the foundation of which is good horsemanship, is therefore one of its principal requirements. In line, the men ride less close together, so as to be always prepared for changes of front and other evolutions. In the United States army there are 10 regiments of cavalry, all of which are really mounted infantry.—The tactical unity in cavalry is the squadron, comprising as many men as the voice and immediate authority of one commander can control during evolutions. The strength of a squadron varies from 100 men in England to 200 men in France; those of the other armies also being within these limits. A regiment comprises 4, 6, 8, 10, or 12 squadrons. The weakest regiments are the English, 400 to 480 men; the strongest the Austrian light horse, 1,600 men. Strong regiments are apt to be unwieldy; too weak ones are very soon reduced by a campaign. Thus the British light brigade at Balaklava, not two months after the opening of the campaign, numbered in five regiments of two squadrons each scarcely 700 men, or just half as many as one Russian hussar regiment on the war footing. Peculiar formations are: with the British the troop or half squadron, and with the Austrians the division or double squadron, an intermediate link which alone renders it possible for one commander to control their strong regiments of horse.—Before Frederick the Great, all cavalry was formed at least three deep. He first formed his hussars, in 1743, two deep, and at the battle of Rossbach had his heavy horse formed the same way. After the seven years' war this formation was adopted by all other armies, and is the only one now in use. For purposes of evolution the squadron is divided into four divisions. Wheeling from line into open column of divisions, and back into line from column, form the chief and fundamental evolution of all cavalry manœuvres. Most other evolutions are only adapted either for the march (the flank march by three, &c.), or for extraordinary cases (the close column by divisions or squadrons). The action of European cavalry in battle is generally a hand-to-hand encounter; its fire is of subordinate importance; steel, either sword or lance, is its chief weapon; and all cavalry action is concentrated in the charge. Thus the charge is the criterion for all movements, evolutions, and positions of cavalry. Whatever obstructs the facility of charging is faulty. The impetus of the charge is produced by concentrating the highest effort both of man and horse into its crowning moment, the moment of actual contact with the enemy. In order to effect this, it is necessary to approach the enemy with a gradually in-

creasing velocity, so that the horses are put to their full speed at a short distance from the enemy only. The execution of such a charge is about the most difficult matter that can be asked from cavalry. It is extremely difficult to preserve perfect order and solidity in an advance at increasing pace, especially if there is much not quite level ground to go over. The difficulty and importance of riding straight forward is here shown; for unless every rider rides straight to his point, there arises a pressure in the ranks, which is soon rolled back from the centre to the flanks, and from the flanks to the centre; the horses get excited and uneasy, their unequal speed and temper come into play, and soon the whole line is straggling along in anything but a straight alignment, and with anything but that closed solidity which alone can insure success. Then, on arriving in front of the enemy, it is evident that the horses will attempt to refuse running into the standing or moving mass opposite, and that the riders must prevent their doing so; otherwise the charge is sure to fail. The rider, therefore, must not only have the firm resolution to break into the enemy's line, but he must also be perfectly master of his horse. The regulations of different armies give various rules for the mode of advance of the charging cavalry, but they all agree in this point, that the line, if possible, begins to move at a walk, then trot, at from 300 to 150 yards from the enemy canter, gradually increasing to a gallop, and at from 20 to 30 yards from the enemy full speed. All such regulations, however, are subject to many exceptions; the state of the ground, the weather, the condition of the horses, &c., must be taken into consideration in every practical case. If in a charge of cavalry against cavalry both parties actually meet, which is by far the most uncommon case in cavalry engagements, the swords are of little avail during the actual shock. It is the momentum of one mass which breaks and scatters the other. The moral element, bravery, is here at once transformed into material force; the bravest squadron will ride on with the greatest self-confidence, resolution, rapidity, *ensemble*, and solidity. Thus it is that no cavalry can do great things unless it has plenty of "dash" about it. But as soon as the ranks of one party are broken, the swords, and with them individual horsemanship, come into play. A portion at least of the victorious troop has also to give up its tactical formation, in order to mow with the sword the harvest of victory. Thus the successful charge at once decides the contest; but unless followed up by pursuit and single combat, the victory would be comparatively fruitless. It is this immense preponderance of the party which has preserved its tactical compactness and formation, over the one which has lost it, that explains the impossibility for irregular cavalry, be it ever so good and so numerous, to defeat regular cavalry. There is no doubt that so far as individual horsemanship and swordmanship is concerned, no regular

cavalry ever approach the irregulars of the nations of horse warriors of the East; and yet the very worst of European regular cavalries has always defeated them in the field. From the defeat of the Huns at Châlons (451) to the sepooy mutiny of 1857, there is not a single instance where the splendid but irregular horsemen of the East have broken a single regiment of regular cavalry in an actual charge. Their irregular swarms, charging without concert or compactness, cannot make any impression upon the solid, rapidly moving mass. Their superiority can only appear when the tactical formation of the regulars is broken, and the combat of man to man has its turn; but the wild racing of the irregulars toward their opponents can have no such result. It has only been when regular cavalry, in pursuit, have abandoned their line formation and engaged in single combat, that irregulars, suddenly turning round and seizing the favorable moment, have defeated them; indeed, this stratagem has made up almost the whole of the tactics of irregulars against regulars, ever since the wars of the Parthians and the Romans. Of this there is no better example than that of Napoleon's dragoons in Egypt, undoubtedly the worst regular cavalry then existing, which defeated in every instance the most splendid of irregular horsemen, the Mamelukes. Napoleon said of them, two Mamelukes were decidedly superior to three Frenchmen; 100 Frenchmen were a match for 100 Mamelukes; 300 Frenchmen generally beat 300 Mamelukes; 1,000 Frenchmen in every instance defeated 1,500 Mamelukes. However great may be the superiority in a charge of that body of cavalry which best preserves its tactical formation, it is evident that even this body must, after the successful charge, be comparatively disordered. The success of the charge is not equally decisive on every point; many men are irretrievably engaged in single combat or pursuit; and it is comparatively but a small portion, mostly belonging to the second rank, who remain in some kind of line. This is the most dangerous moment for cavalry; a very small body of fresh troops, thrown upon it, would snatch the victory from its hands. To rally quickly after a charge is therefore the criterion of a really good cavalry, and it is in this point that not only young but also otherwise experienced and brave troops are deficient. The British cavalry, riding the most spirited horses, are especially apt to get out of hand, and have almost everywhere suffered severely for it (*e. g.*, at Waterloo and Balaklava). The pursuit, on the rally being sounded, is generally left to some divisions or squadrons, especially or by general regulations designated for this service; while the mass of the troops re-form to be ready for all emergencies. For the disorganized state, even of the victors, after a charge, is inducement enough to always keep a reserve in hand which may be launched in case of failure in the first instance; and thus it is that the first rule in cavalry tactics has always

been, never to engage more than a portion of the disposable forces at a time. This general application of reserves will explain the variable nature of large cavalry combats, where the tide of victory ebbs and flows to and fro, either party being beaten in his turn until the last disposable reserves bring the power of their unbroken order to bear upon the disordered, surging mass, and decide the action. Another very important circumstance is the ground. No arm is so much controlled by the ground as cavalry. Heavy, deep soil will break the gallop into a slow canter; an obstacle which a single horseman would clear without looking at it, may break the order and solidity of the line; and an obstacle easy to clear for fresh horses will bring down animals that have been trotted and galloped about without food from early morning. Again, an unforeseen obstacle, by stopping the advance and entailing a change of front and formation, may bring the whole line within reach of the enemy's flank attacks. An example of how cavalry attacks should not be made was Murat's great charge at the battle of Leipsic. He formed 14,000 horsemen into one deep mass, and advanced on the Russian infantry which had just been repulsed in an attack on the village of Wachau. The French horse approached at a trot; about 600 or 800 yards from the allied infantry they broke into a canter; in the deep ground the horses soon got fatigued, and the impulse of the charge was spent by the time they reached the squares. Only a few battalions which had suffered severely were ridden over. Passing round the other squares, the mass galloped on through the second line of infantry, without doing any harm, and finally arrived at a line of ponds and morasses which put a stop to their progress. The horses were completely blown, the men in disorder, the regiments mixed and uncontrollable; in this state two Prussian regiments and the Cossacks of the guard, in all less than 2,000 men, surprised their flanks and drove them all pell mell back again. In this instance there was neither a reserve for unseen emergencies, nor any proper regard for pace and distance; the result was defeat.—The charge may be made in various formations. Tacticians distinguish the charge *en muraille*, when the squadrons of the charging line have none or but very small intervals between each other; the charge with intervals, where there are from 10 to 20 yards from squadron to squadron; the charge *en échelon*, where the successive squadrons break off one after the other from one wing, and thus reach the enemy not simultaneously but in succession, which form may be much strengthened by a squadron in open column on the outward rear of the squadron forming the first *échelon*; finally, the charge in column. This last is essentially opposed to the whole of the former modes of charging, which are all of them but modifications of the line attack. The line was the general and fundamental form of all cavalry charges up to Na-

poleon. In the whole of the 18th century we find cavalry charging in column in one case only, *i. e.*, when it had to break through a surrounding enemy. But Napoleon, whose cavalry was composed of brave men but bad riders, had to make up for the tactical imperfections of his mounted troops by some new contrivance. He began to send his cavalry to the charge in deep columns, thus forcing the front ranks to ride forward, and throwing at once a far greater number of horsemen upon the selected point of attack than could have been done by a line attack. The desire of acting with masses, during the campaigns succeeding that of 1807, became with Napoleon a sort of monomania. He invented formations of columns which were perfectly monstrous, and which, happening to be successful in 1809, were adhered to in the later campaigns, and helped to lose him many a battle. He formed columns of whole divisions either of infantry or of cavalry, by ranging deployed battalions and regiments one behind the other. This was first tried with cavalry at Eckmühl, in 1809, where ten regiments of cuirassiers charged in column, and two regiments deployed in front, four similar lines following at distances of about 60 yards. With infantry, columns of whole divisions, one battalion deployed behind the other, were formed at Wagram. Such manœuvres might not be dangerous against the slow and methodical Austrians of the time, but in every later campaign, and with more active enemies, they ended in defeat. We have seen what a pitiable end the great charge of Murat at Wachau, in the same formation, came to. The disastrous issue of D'Erlon's great infantry attack at Waterloo was caused by its being made with this formation. With cavalry the monster column appears especially faulty, as it absorbs the most valuable resources into one unwieldy mass, which, once launched, is irretrievably out of hand, and, whatever success it may have in front, is always at the mercy of smaller bodies well in hand that are thrown on its flanks. With the materials for one such column, a second line and one or two reserves might be prepared, the charges of which might not have such an effect at first, but would certainly by their repetition ultimately obtain greater results with smaller losses. In most services, indeed, this charge in column has either been abandoned, or it has been retained as a mere theoretical curiosity, while for all practical purposes the formation of large bodies of cavalry is made in several lines at charging intervals, supporting and relieving each other during a prolonged engagement. Napoleon, too, was the first to form his cavalry into masses of several divisions, called corps of cavalry. As a means of simplifying the transmission of commands in a large army, such an organization of the reserve cavalry is eminently necessary; but when maintained on the field of battle, when these corps had to act in a body, it never, except in the American civil war, produced any ade-

quate results. In the present European armies the cavalry corps is generally retained, and in the Prussian, Russian, and Austrian services there are even established normal formations and general rules for the action of such a corps on the field of battle, all of which are based on the formation of a first and second line and a reserve, together with indications for the placing of the horse artillery attached to such a body.—We have hitherto spoken of the action of cavalry so far only as it is directed against cavalry. But one of the principal purposes for which this arm is used in battle, in fact its principal use at present, is its action against infantry. We have seen that in the 18th century infantry, in battle, scarcely ever formed square against cavalry. It received the charge in line, and if the attack was directed against a flank, a few companies wheeled back, *en potence*, to meet it. Frederick the Great instructed his infantry never to form square except when an isolated battalion was surprised by cavalry; and if in such a case it had formed square, "it may march straight against the enemy's horse, drive them away, and, never heeding their attacks, proceed to its destination." The thin lines of infantry in those days met the cavalry charge with full confidence in the effect of their fire, and indeed repelled it often enough; but where they once got broken, the disaster was irreparable, as at Hohenfriedberg and Zorndorf. At present, when the column has replaced the line in so many cases, the rule is that infantry always, where it is practicable, form square to receive cavalry. There are indeed many instances in modern wars where good cavalry has surprised infantry in line and had to fly from its fire; but they form the exception. The old question, whether cavalry has a fair chance of breaking squares of infantry, has lost a good deal of its importance, owing to the improvement in firearms and to the new tendency in the use of cavalry. It appears to be generally admitted that, under ordinary circumstances, a good, intact infantry, not shattered by artillery fire, stands a very great chance against cavalry; while with young foot soldiers, who have lost the edge of their energy and steadiness by a hard day's fighting, by heavy losses and long exposure to fire, a resolute cavalry has the best of it. There are exceptions, such as the charge of the German dragoons at Garcia Hernandez in 1812, where each of three squadrons broke an intact French square; but as a rule, a cavalry commander will not find it advisable to launch his men on such infantry. At Waterloo, Ney's grand charges with the mass of the French reserve cavalry on Wellington's centre could not break the English and German squares, because these troops, sheltered a good deal behind the crest of the ridge, had suffered very little from the preceding cannonade, and were almost all as good as intact. Such charges, therefore, are adapted for the last stage of a battle only, when the infantry has been a good deal shattered and

exhausted both by actual engagement and by passivity under a concentrated artillery fire; and in such cases they act decisively, as at Borodino and Ligny, especially when supported, as in both these cases, by infantry reserves.—We cannot enter here into the various duties which cavalry may be called upon to perform on outpost, patrolling, and escorting service, &c. A few words on the general tactics of cavalry, however, may find a place. Infantry having more and more become the main stay of battles, the manœuvres of the mounted arm are necessarily more or less subordinate to those of the former. And as modern tactics are founded upon the admixture and mutual support of the three arms, it follows that for at least a portion of the cavalry all independent action is entirely out of the question. Thus the cavalry of an army is always divided into two distinct bodies: divisional cavalry and reserve cavalry. The first consists of horsemen attached to the various divisions and corps of infantry, and under the same commander with them. In battle, its office is to seize any favorable moments which may offer themselves to gain an advantage, or to disengage its own infantry when attacked by superior forces. Its action is naturally limited, and its strength is not sufficient to act any way independently. The cavalry of reserve, the mass of the cavalry with the army, in European armies acts in the same subordinate position toward the whole infantry of the army as the divisional cavalry does toward the infantry division to which it belongs, but in America, as already shown, it is more independent. Accordingly, the reserve cavalry will be held in hand till a favorable moment for a great blow offers itself, either to repel a grand infantry or cavalry attack of the enemy, or to execute a charge of its own of a decisive nature. From what has been stated above, it will be evident that the proper use of the cavalry of reserve is generally during the latter stages of a great battle, or in an independent movement upon the rear or communications of the enemy. Such immense successes as Seydlitz obtained with his horse may not be expected hereafter; but still, many great battles of modern times have been very materially influenced by the part cavalry has played in them. But the great importance of cavalry lies in pursuit. Infantry supported by artillery need not despair against cavalry so long as it preserves its order and steadiness; but once broken, no matter by what cause, it is a prey to the mounted men that are launched against it. There is no running away from the horses; even on difficult ground, good horsemen can make their way; and an energetic pursuit of a beaten army by cavalry is always the best and the only way to secure the full fruits of the victory. Thus, whatever supremacy in battles may have been gained by infantry, cavalry still remains an indispensable arm, and will always remain so; and now, as heretofore, no army can enter the lists with a fair chance of suc-

cess unless it has a cavalry that can both ride and fight.

CAVAN. I. The southernmost county of the province of Ulster, Ireland, bounded by the counties Fermanagh, Monaghan, Meath, Westmeath, Longford, and Leitrim; area, 746 sq. m.; pop. in 1871, 140,555. The soil is wet and marshy, but with drainage it is rendered productive. The mountainous districts, which include a considerable part of the county, are barren. Coal, iron, lead, and copper are found; marl, fuller's earth, potter's and brick clays are plentiful. There are many mineral springs, of which that of Livalinbar is the most noted. Cavan was anciently called Breifne (Brenny), and was part of the territory of O'Rourke, the Irish chief, the seduction of whose wife by Dermot MacMurrough, king of Leinster, was the immediate cause of the English invasion. It was first made shire ground toward the close of the 16th century. The county was divided into baronies among the native possessors, five falling to the lot of the O'Reilly family. The O'Reillys having forfeited their possessions by rebellion at the beginning of the 17th century, Cavan reverted to the British crown. It now returns two members to parliament. II. The county town, on the Dublin and Galway railway, 85 m. N. E. of Galway, and 65 m. N. W. of Dublin; pop. about 3,000. Petty and quarter sessions, annual fairs, and a weekly market are held in the town. It contains a fine parish church, a Catholic chapel and nunnery, Presbyterian and Methodist meeting houses, a fever hospital, an infirmary, a royal endowed school, a barracks, and a public pleasure ground, bequeathed to the town by Lady Fernham.

CAVE, Edward, an English printer and bookseller, born at Newton, Warwickshire, Feb. 29, 1691, died in London, Jan. 10, 1754. He founded the "Gentleman's Magazine," the first number of which appeared in January, 1731, and which still continues to be published. The original purpose of this periodical, according to the prospectus, was to preserve from the newspapers "essays on various subjects for entertainment." Original communications, however, were afterward admitted, Dr. Johnson being a favorite contributor, and he wrote the "parliamentary speeches" which appeared in this magazine from 1740 to 1743. It has undergone many changes of management, but its special and most valuable features were always till recently antiquarian research and contemporary biography and history. The success of the magazine led to the establishment of the "London Magazine" and other rival publications of the same class, in which the "Gentleman's Magazine" was the pioneer. Cave was the early friend and patron of Dr. Johnson, and for a long time was his only publisher. Dr. Johnson was present at his deathbed, and he wrote the "Life of Cave" which was published in the "Gentleman's Magazine" for February, 1754. Cave had some claims to authorship, and wrote an "Account of Criminals."

CAVE, William, an English scholar and divine, born at Pickwell, Leicestershire, Dec. 30, 1637, died at Windsor, Aug. 4, 1713. He was educated at St. John's college, Cambridge, and became successively vicar of Islington, rector of Allhallows the Great, London, and chaplain to Charles II., who made him canon of Windsor. Having selected as his residence the quiet village of Isleworth, Middlesex, he devoted his life to researches into the history of the church. He produced a great number of works, the most important of which are his "Primitive Christianity" (1672), "Lives of the Apostles" (1675), and "Lives of the Fathers" (*Ecclesiastici*, 1682). His style is concise, simple, and easy, and his sentiments so liberal that he has been accused of Socinianism. A monument in Islington church marks his burial place.

CAVEAT (Lat. *cavere*, to beware), a formal notice or caution given by a party in interest to a court, judge, or public officer against the performance of certain acts, such as permitting a will to be proved, granting letters of administration, or patents for inventions, or for lands. Its object is to prevent any proceedings being taken without such notice to the party giving it as shall enable him to appear and show cause against the proposed action.

CAVEAU, a Parisian literary and convivial association, initiated in 1729 in the shop of the grocer Gallet, who was a witty songster and a friend of Cr billon the younger and other literary men. Subsequently the suspicion arose that Gallet was deriving too many pecuniary advantages from the habitu s, and the place of meeting was removed to a tavern known as the Caveau (cave), whence the name. The dinners on the first Sunday of every month were attended by Helv tius and other celebrated persons. The association was discontinued toward the end of 1739.—Cappelle and Armand Gouff  established in 1806 the *Caveau moderne* in the caf  de Cancale, and the dinners, which took place on the 20th day of the month at the Rocher de Cancale, were presided over by Pierre Laujon, and after his death in 1811 by D sausiers, most of whose songs were composed especially for these reunions. The latter invited B ranger, who was here first encouraged to publish his songs. After various vicissitudes the Caveau was reorganized in 1834 by Albert Mont mont, at the Pestel restaurant near the caf  de la R gence; and subsequently the monthly dinners took place in the caf  Corazza, in the palais royal, and Jules Janin was received as a member in 1866. At the present day the meetings are rather more ceremonious and academical than formerly.

CAVEDONE, Jacopo or Giacomo, an Italian painter, born at Sassuolo, Modena, in 1577, died in Bologna in 1660. Escaping from a home made unendurable to him by his father's violence, he became page to a nobleman in Bologna, whose picture gallery gave him an opportunity of cultivating artistic tastes, which were developed under the tuition of several masters, especially

Annibale Carracci, who soon ranked him among his ablest pupils. Subsequently he studied in Venice, and on his return to Bologna he executed pictures of the "Nativity" and the "Adoration of the Magi" for the San Paolo church, which gave him great reputation. His masterpiece in the church of the Mendicanti di Dentro, representing St. Alo and St. Petronio kneeling before the Virgin and child, with a glory of angels, is celebrated for the imposing and yet simple cast of the drapery, and for its matchless beauties of composition, coloring, and expression; it has been often ascribed, like many of his other productions, to his teacher Carracci, and to other illustrious masters. Guido took him as a model in fresco painting, in which he produced the finest and most harmonious effects by using a limited but the most suitable variety of tints. In richness of coloring he was unrivalled among the artists of the Bolognese school. The latter part of his life was saddened by charges of witchcraft brought against his wife by superstitious people, and by the death of an only son who was a promising artist. Distracted to the verge of madness and reduced to starvation by his inability to work, he fell senseless in the streets while unavailingly asking for alms, and was removed to a stable, where he soon breathed his last. Besides the pictures mentioned, most of his other works are in Bologna. Florence possesses his portrait painted by himself, Munich his "Dead Christ mourned by an Angel," and the Louvre in Paris his "St. Cecilia."

CAVEDONI, Celestino, an Italian arch ologist and numismatist, born near Reggio, May 18, 1795, died in Modena, Nov. 26, 1865. He was educated in the episcopal seminary at Modena, studied arch ology, Greek, and Hebrew at Bologna, became director of the numismatic collections of the library of Modena, and from 1830 to 1863 was professor of hermeneutics at the university. His principal works are *Numismatica Biblica* (Modena, 1850; German translation by Werlhof, 2 vols., Hanover, 1855-'6), and *Confutazione dei principali errori di Ernesto Renan nella sua Vie de J sus* (Modena, 1863).

CAVELIER, Pierre Jules, a French sculptor, born in Paris, Aug. 30, 1814. He studied under Delaroche and David d'Angers, early obtained the grand prize, and was for some years supported in his studies at Rome by the French academy. He acquired celebrity in 1849 by his statue of Penelope, receiving the medal of honor and a three years' pension of 4,000 francs. In 1865 he became a member of the institute. His works are remarkable for purity and grace. His statue representing "Truth" is in the Luxembourg; that of Ab lard is in the new Louvre; and he has also made busts of Ary Scheffer, Horace Vernet, Napoleon I., and others.

CAVENDISH, Ada. See p. 799.

CAVENDISH, Henry, an English philosopher, born at Nice, Oct. 10, 1731, died in London, Feb. 24, 1810. He was a man of great wealth

and of high attainments in chemistry and in general physics. He was the discoverer of the composition of water and of nitric acid, and proved that the electric spark will generate nitric acid from common air. He measured the density of the earth by direct comparison with balls of lead, and improved the modes of dividing astronomical instruments. He was the first chemical experimenter and discoverer in many important branches of that science. His writings may be found in the "Philosophical Transactions."

CAVENDISH, or **Candish**, Sir **Thomas**, an English adventurer of the 16th century. He was the son of a gentleman of good estate, residing at Trimley St. Martin in Suffolk; but having spent his patrimony, he engaged in a predatory excursion against the Spanish American colonies, fitting out three vessels of 120, 60, and 40 tons. This expedition started July 22, 1586, and entered the straits of Magellan Jan. 6, 1587. They were 33 days in clearing the straits, spending some time in examining the coast. On the Pacific coast they burnt Payta, Acapulco, and other towns, and finally captured the Spanish galleon *Santa Anna*, of 700 tons, loaded with a valuable cargo and 122,000 Spanish dollars. Cavendish then started from California, crossed the Pacific to the Ladrone islands, through the Indian archipelago and strait of Java, and around the Cape of Good Hope, reaching England Sept. 9, 1588, and was knighted by Queen Elizabeth. In August, 1591, he started again, but he experienced bad weather and sickness, his crew grew mutinous, and he died at sea in 1593.

CAVERY, or **Cauvery** (anc. *Chaleris*), a river of southern India, rises among the Coorg hills, near the W. or Malabar coast, 4,000 ft. above the level of the sea, in lat. 12° 25' N., lon. 75° 34' E. It flows in a circuitous course mainly S. E., traversing the whole breadth of the peninsula, and falls into the bay of Bengal, on the E. or Coromandel coast. In the vicinity of Trichinopoly it separates into several branches (the principal of which is the Coleroon river, 92 m. long), which descend in separate falls of 200 and 300 ft., and enter the sea by numerous mouths in the province of Tanjore. The whole course of the Cavery is about 470 m., and it is navigable only for small boats. The craft in use are circular baskets, from 9 to 14 ft. in diameter, covered with buffalo leather. In these produce is brought down the river, but as the violence of the stream makes upward navigation impossible, they are taken to pieces and the leather carried back on the heads of the crew.

CAVIANA, an island of Brazil, 35 m. long and 20 m. wide, in the N. mouth of the Amazon, under the equator. It is level, fertile, and well stocked with cattle. The small town of Roberdello is on its S. E. side.

CAVIARE, a kind of food prepared from the roes of large fish, especially the sturgeon. It is chiefly made in Russia, which country mo-

nopolizes this branch of commerce. From Astrakhan alone 30,000 bbls. have been exported in a single year. The process of manufacturing consists in thoroughly cleaning the roe from its membranes. Salt is then well mixed in, and the liquor pressed out. It is then dried and packed for sale. The best kind, that which is most thoroughly freed from the membrane, does not easily become fetid, and is packed in kegs; the inferior kind is made into small thin cakes. It is much used during seasons of fast in Italy, Russia, Greece, and Turkey, being eaten on bread with oil and vinegar or lemon.

CAVITE. **I.** A province of Luzon, Philippine islands, situated on the S. E. side of the bay of Manila; area, 489 sq. m.; pop. about 57,000. **II.** A town of the province, the naval depot of and the strongest place in the Spanish possessions in the East, 7 m. S. W. of Manila; pop. about 3,000. It is built on the E. extremity of a low bifurcated peninsula stretching about 3 m. into the sea, having between its extremities the outer harbor, while the inner harbor is S. of the town. Neither has more than four fathoms of water, though large ships moor near the inner harbor. The houses are two stories high, built chiefly of wood, the windows being furnished with semi-transparent shell instead of glass. It has two churches, three convents, an arsenal, magazine, and ship yard, and enjoys a considerable trade, but has declined of late years. During half the year it is the port of Manila.

CAVOUR, **Camillo Benso**, count, an Italian statesman, born in Turin, Aug. 10, 1810, died there, June 6, 1861. Being a younger son of a noble and wealthy family, he was destined for the army, entered the military academy at an early age, and in 1828 was appointed lieutenant of engineers, and stationed at Genoa. In 1831 he left the army because he disliked garrison life, and had moreover incurred the displeasure of King Charles Albert by speaking favorably of the French revolution of 1830. He retired to his estates, and devoted himself to their improvement, but still gave much attention to science and political economy. He made long visits to France and England, in order to study the industrial and political systems of those countries. Returning to Turin, he became attached to the reform party, and in 1842 was one of the founders of the *associazione agraria*, a semi-political society, and in 1847, in conjunction with Cesare Balbo, established the journal *Il Risorgimento* ("The Resurrection"), which became a powerful political organ. He was elected to the Sardinian parliament, and had much to do in inducing the king to grant the constitution of 1848, and to declare war against Austria. The campaigns both of 1848 and 1849 ended disastrously, and Charles Albert abdicated. In 1850 Cavour was called to the cabinet of Victor Emanuel as minister of commerce and agriculture. Soon after he became also minister of the marine and finance, and in 1852 was named president of

the council, in place of D'Azeglio. At this time what is now the kingdom of Italy was divided into several governments, having in all a population of about 25,000,000, and all over-awed by the military power of Austria, which had reconquered Lombardy and Venetia, re-established the archducal and ducal authorities in Tuscany, Modena, and Parma, and occupied a portion of the papal territory by its troops. Though one of the smaller divisions in point of population, Sardinia was by far the most advanced in industry and national military force. All the energies of Cavour were now bent on preparing his state, which was slowly but steadily recovering from the shocks and humiliations suffered in 1848-'9, for the speedy resumption of the struggle with the Hapsburgs, with the object of uniting all Italy into one nation under the king of Sardinia. He obtained a European reputation by the course he took in opposing the pope and the ultramontanes at home, and in joining France, Great Britain, and Turkey against Russia in the Crimean war. In conjunction with the marquis Villamarina, he represented Sardinia in the peace conference held at Paris in the spring of 1856. During the sittings of this conference he succeeded in winning over Napoleon III. almost completely for his purposes, energetically protested against the continued occupation of the Pontifical States by foreign troops, and represented the necessity of inducing the king of Naples to moderate his system of government. He also carried through the Sardinian parliament the measure for suppressing convents and monasteries, and secularizing their estates, which drew down upon him, and all who participated in the enactment and execution of this statute, the major excommunication of the pope, and the hostility of a large portion of the Sardinian clergy and their supporters in parliament. Early in 1859 the contest between Austria and Sardinia broke out afresh, the latter counting upon the support of France. The Sardinian army was put upon a war footing; and on April 23 Austria demanded by an ultimatum that Sardinia should at once disarm. This was refused, and on the 27th the Austrians invaded Piedmont. The emperor Napoleon had promised to support Sardinia in case of invasion, and on May 3 he declared war against Austria. The victories of Magenta and Solferino put it in the power of the allies to dictate their own terms, and nothing less than the entire abandonment of Italy by the Austrians was looked for. The treaty of Villafranca, leaving Austria in possession of Venetia, and eventually involving the cession of Savoy and Nice to France, which Napoleon unexpectedly concluded with Francis Joseph, without consulting Victor Emanuel, disgusted Cavour. He resigned his post as prime minister, and was succeeded by Rattazzi, whose administration proved unsuccessful. In January, 1860, Cavour was again placed at the head of the government, with a ministry of his

own choice. He ostensibly opposed the movement of Garibaldi against Sicily and Naples, but soon secretly aided him with all means at his disposal; and Garibaldi, having been proclaimed dictator there, made over his authority to Victor Emanuel, and the people of the Two Sicilies accepted him as their sovereign. Gen. Cialdini, first operating in the north against Lamoricière, and then coöperating with Garibaldi, completed the work, with the aid of the Sardinian fleet under Persano. On Dec. 23, 1860, the decree appeared by which Sardinia (which had already absorbed Lombardy, Tuscany, Parma, and Modena) and the Two Sicilies, together with Umbria and the Marches, wrested from the pope, were united together as the kingdom of Italy, under the sceptre of Victor Emanuel. On Feb. 18, 1861, Cavour opened the first parliament of united Italy. Near the end of April there was a public avowal of the reconciliation between him and Garibaldi, who had reproached him, among other things, with supineness in resisting the encroachments of Napoleon. This was the last public act of Cavour. On May 30 he was attacked with a fever which ended his life. Cavour was one of the most enlightened, versatile, and energetic statesmen of the age; and though by several of his proceedings he incurred the bitter censures of D'Azeglio, Garibaldi, and Mazzini, it is now conceded on all hands that to him more than any other man is owing the achievement of the unity of Italy.—See Botta, "Life, Character, and Policy of Count Cavour" (New York, 1862), and Treitschke's brilliant essay, *Cavour*, in his *Historische und politische Aufsätze* (new series, Leipsic, 1870).

CAVY, a mammal of the order *rodentia*, family *histicidae*, subfamily *cavina* (Waterhouse), and genera *dolichotis* and *cavia*. This subfamily is exclusively South American; the molar teeth are $\frac{4}{4}$, without roots, those of the upper jaw converging and nearly meeting in front, incisors short; four toes on the fore feet, and only three on the hind, and without clavicles. The cavies have been generally associated with the agoutis, and classed under the section *subungulata* of Illiger, erroneously in the opinion of Mr. Waterhouse, though the two groups approach each other in many respects. In some members of the subfamily, and probably in all, the fauces, or entrance to the throat, form a funnel-shaped cavity, opening backward into the pharynx by a small aperture capable of admitting only very finely chewed food; by the action of the muscles this conical cavity is made to pass over the epiglottis, preventing the entrance of the food into the windpipe; the stomach is simple, but the cæcum is large and complicated. The molar teeth of the upper jaw have the entering fold of enamel on the inner side, while in the lower it is on the outer side; the palatic portion of the skull in front of them is much contracted, and between them triangular, the posterior emargination being very deep, and exposing the anterior sphenoid bone;

in the lower jaw a well marked ridge extends along the outer side from the first molar, at first horizontally backward, but afterward curving upward to the condyloid portion, distinguishing them from all other rodents; the condyle is but little elevated above the crowns of the molars, and the coronoid process is extremely small, in this and other particulars resembling the tailless hares (*lagomys*). The genus *dolichotis* (Desm.) is characterized by long limbs; ears half as long as the head, pointed, broad at the base; tail very short, and curved upward; metatarsus clothed with hairs anteriorly, posteriorly with the heel naked; molars small, the three front upper and the three posterior lower divided by folds of enamel into two equal lobes, the last upper and the front lower being three-lobed. The long legs, large ears, and distinct tail distinguish this from the genus *cavia*, of which the Guinea pig is a well known example. The cavies approach the hares in their comparatively short incisor teeth, the imperfect condition of the palate before alluded to, the narrow bodies of the sphenoid bones, and the small brain cavity; the skull, however, is not so large in its facial portion, and is more depressed, with much smaller incisive openings.—Uniting the two groups of the true cavies and the hares, comes the typical species of the genus *dolichotis*, the Patagonian cavy (*D. Patachonica*, Shaw). This animal is from 2½ to 3 ft. in length, about 13 inches high at the shoulders, weighing from 20 to 36 lbs. when full grown. It inhabits the desert and gravelly plains of Patagonia, from about lat. 48½° to 37½° S., on the Atlantic coast, and extending into La Plata as far as Mendoza, 33½° S. The fur is dense and crisp, gray on the upper parts of the head and body, yellowish rusty on the sides; chin, throat, and abdomen white; rump black, with a broad white band immediately

like the rabbit, though not very fast; it seldom squats like the hare, is very shy, and feeds by day; it produces two young at a birth, in its burrow; its flesh is white, but dry and tasteless. It has been generally mistaken by travellers for a hare, which it resembles in its legs, ears, and tail; the head is large, terminating in a blunt muzzle clothed with hairs; the upper lip is slightly notched; the mustaches are very long and black.—The genus *cavia* (Klein) is characterized by short limbs and ears, by feet naked beneath, and by molars nearly of equal size, each with two principal lobes. The genus presents two modifications of the molars: in one, the lobes are nearly equal, and the hinder lobe of the upper series has no distinct indenting fold of enamel; for this F. Cuvier has instituted the genus *cerodon*, which Waterhouse retains as a subgenus; in the other (containing the Guinea pig), the hinder lobe is the larger, and in the upper series has a deep indenting fold of enamel on the outer side, and the corresponding half of the lower molar with a deep fold on the inner side. The following species belong to the subgenus *cerodon*; those of *cavia* proper will be described under



Rock Cavy (*Cerodon rupestris*).

GUINEA PIG. The rock cavy (*C. rupestris*, Pr. Max.) inhabits the rocky districts of the interior of Brazil, in the higher parts of the river courses. The nails are short, obtuse, and projecting from large fleshy pads; the soft fur is of a grayish color, with a rufous tint on the back; lower parts white, with a pale ochreous yellow tint on the abdomen; fore legs whitish with a rufous tinge, hind legs chestnut red behind. The length is about 14 inches, and it stands higher than most cavies. Its flesh is much esteemed by the Indians. The rufous-brown cavy (*C. flavidens*, Brandt) is somewhat larger than the Guinea pig, but its head, ears, and fur are shorter; the incisors are yellow; the color above inclines to a yellowish brown, below to yellowish white; it inhabits Brazil. Some of its varieties are of a rich rufous-brown color. Spix's cavy (*C. Spixii*, Wagler) inhabits Brazil from Rio de Janeiro to the Amazon; the general color is gray, with a tinge of brown on the back; the space between the eye and ear, a patch behind the ear, and the lower parts white; the incisors yellow. It is larger than the Guinea pig, with shorter and softer fur. The Bolivian cavy (*C. Bolivienensis*,



Patagonian Cavy (*Dolichotis Patachonica*).

above the tail; limbs rusty yellow, but grayish in front. It lives in burrows, but wanders occasionally to great distances from home in parties of two or three; it runs much

Waterh.) inhabits the elevated regions of Bolivia; the incisors are orange yellow; general color of the fur gray, with a faint yellow tinge; throat, abdomen, and feet whitish. It rarely exceeds 10 inches in length. Some of the lofty plains of the Andes are so undermined by the burrows of these animals, that every step of a horse is attended with danger. It is very shy. The southern cavy (*C. australis*, Is. Geoff.) is found in Patagonia from the straits of Magellan to lat. 39° S. The incisors are white; the fur soft and of a light grayish color; the eyes edged with white, and a spot of this color behind the ears. It is about 9 inches long, and is very tame; it lives in families, digging burrows in sandy hills overgrown with bushes; its food consists of seeds and green herbage, and it has been seen to ascend trees to feed on their fruits. It may be distinguished from all others of the group by the shortness of the head and the comparative length of the tarsi.—Numerous remains of fossil cavy have been found in the diluvial strata of Brazil; M. Lund has described four species from the caverns of that country.

CAWDOR, or **Calder**, a parish of Scotland, mostly in the county of Nairn, with a small section in Inverness; area, 4 sq. m. It contains Cawdor castle, built in the 15th century, in which tradition asserts that King Duncan was murdered by Macbeth, thane of Cawdor, as narrated by Shakespeare. The murder, however, took place in the 11th century. Lord Lovat lay long concealed in this castle after the rebellion of 1745.

CAWNPORE. **I.** A district of British India, in the Northwest Provinces, bounded N. E. by the Ganges, which separates it from Oude, and S. W. by the Jumna, which divides it from Bundelcund; area, 2,348 sq. m.; pop. in 1871, 1,152,628, mostly Hindoos. The chief productions are cotton, sugar, indigo, opium, safflower, wheat, barley, maize, pulse, tobacco, oil seeds, and potatoes. Schools are numerous. Good roads traverse the whole district, and the Ganges canal and great East Indian railway pass through it. It was ceded to the East India company in 1801 by the nawab of Oude.

II. The principal town of the district, situated on the right bank of the Ganges, here about a mile wide, near the junction with the Ganges canal, and on the East Indian railway, 120 m. N. W. of Allahabad, 220 m. S. E. of Delhi, and 1,000 m. from Calcutta by river; pop. about 100,000, of whom half are distributed among the cantonments. It is poorly built, and has but one mosque of any pretension to elegance; but since its selection as a station for troops in 1777 it has acquired great commercial as well as military importance. The lines have accommodations for about 7,000 troops. The civilians, whose offices are in the native town, usually reside in the suburbs. There is here a Protestant church, and a free school, partly supported by a grant from the government, and attended by Hindoos, Mohammedans, and

Europeans.—While the rebellion was raging throughout Bengal in 1857, the military force at Cawnpore, commanded by Sir Hugh Wheeler, consisted of 3,800 men, of whom about 200 were Europeans. In June, apprehending a revolt, he threw up an intrenchment on the parade ground, enclosing two barrack hospitals and a few other buildings, into which he withdrew with about 900 Europeans, of whom two thirds were women, children, and other non-combatants. On the 5th the rising took place. The native regiments marched off, taking with them horses, arms, and ammunition, and setting fire to the bungalows on their way. They placed themselves under the leadership of the rajah of Bittoor, commonly known as the Nena Sahib, seized 35 boat loads of shot and shell on the canal, and the next day appeared before the intrenchment. The siege lasted until the 27th, when the Europeans, now reduced to less than half their original number, surrendered.



Memorial Building on the Scene of the Massacre.

ed on promise of a safe passage to Allahabad. But no sooner had they embarked on the Ganges than they were fired upon from a masked battery. Many were killed in the boats, three or four made their escape, and the rest were captured and brought to land. The men were put to death; the women and children were kept alive till July 15, when the Nena, hearing of Gen. Havelock's advance toward Cawnpore, caused them to be massacred, and had their bodies thrown into a well. After defeating in three battles a strong native force sent out to oppose his march, Havelock entered the city July 18, while the Nena retreated to Bittoor. Memorial gardens have been laid out around the scene of the massacre, and a church erected; also, a fine octagon building around the well, without a roof, enclosing an elaborate tomb.

CAXAMARCA. See CAJAMARCA.

CAXATAMBO. See CAJATAMBO.

CAXIAS, an inland town of Brazil, on the navigable river Itapicuru, in the province and about 300 m. S. S.E. of Maranhão, and 1,230 m. N. of Rio de Janeiro. It is a large town, the centre of an important trade with the interior in cotton, rice, and cattle, which last are raised in large numbers in the surrounding country.

CAXIAS, Luis Alves de Lima, duke de, a Brazilian soldier and statesman, born in Rio de Janeiro about 1800. He entered the army while a boy, and rapidly rose to the ranks of general and baron, and subsequently to those of marshal, marquis, senator, and aide-de-camp of the emperor. He was twice a minister of war and also president of the council, exerting great political influence as a conservative leader. He defeated Rosas in 1851, and commanded against Lopez, 1866-'9. On account of ill health he was superseded by the count d'Eu after the capture of Asuncion, the emperor conferring upon him the title of duke.

CAXTON, William, the first English printer, born in Kent about 1412, died in 1491 or 1492. In his 15th or 16th year he was apprenticed to Robert Large, a London mercer, who became lord mayor in 1439. In 1441 Caxton became a freeman of the mercers' company, who appointed him their agent in the Low Countries, where he remained 23 years. In 1464 he was joined with Robert Whitehill in a commission to continue a treaty between Edward IV. of England and Philip, duke of Burgundy, or, if they thought it better, to make a new one. When the English princess Margaret of York married Charles of Burgundy, she took Caxton into her household. While in her service he translated from the French into English Raoul le Fèvre's *Recueil des histoires de Troye*. From the prologues and epilogues of this work it appears that he was acquainted with the art of printing, and from the character of his types it is evident that he learned it in the Low Countries. The first three printed works of Caxton were the original of Raoul's "History," the oration of John Russell on Charles, duke of Burgundy, being created a knight of the garter, and the translation of Raoul, the last completed in 1471. There is no certain evidence of the exact period of Caxton's return to England; the usual supposition dates it in 1474; it is beyond doubt, however, that in 1477 he had taken up his quarters in the vicinity of Westminster abbey, London. His printing office was in the Almonry, as appears from an old placard preserved at Oxford, which reads as follows: "If it plesse any man spiritual or temporal to bye any Pyes of two and thre comemoracions of Salisburi vse enprynted after the forme of this present lettre whiche ben wel and truly correct, late hym come to Westmonester in to the Almonesrye at the reed pale, and he shal have them, good chepe." Caxton appears to have made use of several different sets of letters, the facsimiles of all which are to be found in Dibdin's account of Caxton's works. He had at first two kinds of the sort

called secretary; afterward he used three founts of great primer, a rude one employed in 1474, and two improved sets later; one fount of double pica, which first appears employed in 1490; and one of long primer. All his works were printed in black letter. Some entries in the parish accounts of St. Margaret, Westminster, in the year 1491 or 1492, are the only information we have of the date of his death: "Item; atte bureyng of William Caxton for iiij. torches vj'. viij^d. Item; for the belle at same bureyng, vj^d." The largest collections of books from Caxton's press are those in the British museum, and in the library of Earl Spencer at Althorp. The names of about 64 productions are known. Warton says that by translating a great number of works from the French he did much in his day to enrich English literature.—See Lewis's "Life of Caxton" (London, 1737); "The Old Printer and the Modern Press," by Charles Knight (1854; new ed., 1861); and "Life and Typography of William Caxton," by William Blades (2 vols. 4to, London, 1861).

CAYCOS. See CAICOS.

CAYENNE, a fortified maritime city, capital of French Guiana, on the W. point of an island of the same name, at the mouth of the Oyak river; lat. 4° 56' N., lon. 52° 20' W.; pop. estimated at 5,700. Cayenne is a penal settlement, the seat of a court of assize and an apostolic prefecture, and the centre of all the trade of the province. It has two distinct divisions, the old and the new town; the former, with the government house and the Jesuits' college, is irregular, and the houses are indifferently built; while the streets of the latter are well laid out and paved, and kept in good order, and the dwellings neat, solid, and for the most part of pleasing appearance. The old and new towns are separated by the Place d'Armes, a spacious parallelogram fringed with orange trees. There are numerous warehouses, and but few public buildings worthy of mention. The port, one of the finest and most commodious on the coast, is protected by a fort commanding the town and several batteries; but it is too shallow to receive ships of much draft. It has convenient quays for loading and discharging vessels. The roadstead, though small, is unrivalled for beauty and convenience by any other on the W. shore of the South Atlantic.—The island, 32 m. in circumference, is separated from the mainland by a narrow channel; its surface is interspersed with small villages, inhabited chiefly by negroes (about 2,500). The principal products are sugar, molasses, cotton, coffee, and spices, which, with cacao, indigo, vanilla, and ebony, form the main exports. The climate is extremely unwholesome for Europeans, and large numbers of the convicts transported thither have been carried off on many occasions by yellow and other malignant fevers. During the first French revolution the practice began of exiling political offenders to Cayenne, the convention in 1795 decreeing the deporta-

tion of Billaud-Varennes, Collot d'Herbois, Barère, and 13 others. Many were sent there by Napoleon III.—Cayenne became a French colony about 1635. It was taken by the English, who held it from 1654 to 1664, when it was retaken by the French. It again fell into the hands of the British in 1667; was conquered by the Dutch in 1672, and recovered by the French in 1675; taken by the Portuguese and British in 1809, and finally restored in 1814.

CAYENNE PEPPER. See CAPSICUM.

CAYES, Aux. See AUX CAYES.

CAYLA, Zoé Victoire du, countess, a favorite of Louis XVIII., born at Boullay-Thierry, near Dreux, Aug. 5, 1785, died at Saint-Ouen, near Paris, March 19, 1852. She was the daughter of the royalist advocate Antoine Omer Talon (1760-1811) and the countess Pestré, and was educated under the direction of Madame Campan. She acquired celebrity by her beauty, grace, and accomplishments, and married in 1802 M. de Baschi, count du Cayla, who died in 1851. The union was unhappy, and they were formally separated after a protracted litigation. In 1807 she obtained the release of her father, who had been sentenced to transportation in 1804 as an agent of the Bourbon princes. After the restoration she gained considerable influence over Louis XVIII., though the relation was, according to most authorities, purely platonic. The clerical party turned her influence to account in furthering their designs. Lafayette asserts in his memoirs that, at the king's request, she destroyed papers relating to an important lawsuit in which her father had been engaged as one of the Bourbon advocates. The aged monarch endowed her with a fine palace at Saint-Ouen, and lavished other gifts and favors upon her; and she was believed to have increased her wealth by receiving bribes for securing appointments to public offices. After her patron's death in 1824 she became chiefly known by industrial and agricultural enterprises. She founded the Savonnerie, a carpet manufactory (originally one of soap), which in 1826 was transferred to the Gobelins. Mehemet Ali having presented her with a long-haired Nubian ram, she raised by crossing with English sheep a new breed of these animals, to which her name has been given.

CAYLEY, Arthur, an English mathematician, born at Richmond in 1821. He was educated at King's college, London, and afterward at Trinity college, Cambridge. He was called to the bar at Lincoln's Inn in 1849, and subsequently practised as a conveyancer till 1863, when he was called to the newly instituted Sadlerian professorship of pure mathematics in Cambridge university, which post he still occupies (1873). He is a fellow of the royal society, and correspondent of the French institute for the section of astronomy. He has contributed numerous valuable papers to the "Philosophical Transactions" and other scientific publications.

CAYLEY, Sir George, an English philosopher, born at Brompton, Yorkshire, in 1773, died Dec. 15, 1857. He undertook the analysis of the mechanical properties of air under chemical and physical action, and his papers on the subject gave rise to many experiments on the navigation of balloons. His experiments on the steam engine led to his invention of the air engine. His discoveries in optics were followed by the invention of an instrument for testing the purity of water by the abstraction of light. He was also the inventor of an ingenious arrangement for obtaining and applying electric power to machinery. He was one of the original promoters of the polytechnic institution at London. Toward the end of the last century he applied to his extensive estates in Yorkshire a new system of arterial drainage. He was also the father of the cottage allotment system. As a politician, he took a prominent part in the election of liberal members of parliament. Upon the passing of the reform bill he was himself chosen member for Scarborough, but on account of age he soon retired.

CAYLUS, or Caylux, a town of France, department of Tarn-et-Garonne, on the river Bonnette, an affluent of the Aveyron, 26 m. N. E. of Montauban; pop. in 1866, 4,950. It has an active trade in agricultural products, and contains the ruins of a fortified castle.

CAYLUS. I. Marthe Marguerite de Villette de Mureay, marquise de, a French woman of fashion, born in Poitou in 1673, died April 25, 1729. A descendant of D'Aubigné, she was converted to Roman Catholicism by her relative Mme. de Maintenon, and acquired celebrity as one of the brilliant wits and social leaders of the French court. Of a precocious beauty, she married in 1686 the marquis de Caylus, a drunkard, who died in November, 1704. Racine, delighted with her histrionic genius, wrote for her the prologue to his tragedy of *Esther*. Her fondness for raillery caused her banishment from the court. Her unhappy marriage led her on her return to accept the duke of Villeroy as her lover. Voltaire remarked that she could not have chosen better, but Mme. de Maintenon, whom she humorously called Nero, had her once more sent out of the capital. She came back in February, 1707, and after Mme. de Maintenon's death in 1719 her lover resided permanently at her house. Her famous *Souvenirs* were edited with notes and a preface by Voltaire (1770; new eds., 1804 and 1806), who regarded them as masterpieces of candor and wit; and Sainte-Beuve assigned to her a distinguished place in his *Galerie des femmes célèbres* (1858). **II. Anne Claude Philippe de Tubières,** count, a French archaeologist, son of the preceding, born in Paris, Oct. 31, 1692, died Sept. 5, 1765. He early entered the military service, and distinguished himself in the war of the Spanish succession. He then devoted himself to literary pursuits and to travel, and published the results of his studies and researches in *Recueil d'antiquités égyptiennes, étrusques,*

grecques, romaines et gauloises (7 vols. 4to). The last volume appeared in 1767, two years after his death. He wrote also several shorter works on art and antiquities, and a number of novels of no great merit. In 1805 appeared the *Souvenirs du comte de Caylus* (2 vols. 12mo).

CAYMAN. See ALLIGATOR.

CAYMANS, three small islands of the British West Indies, in the Caribbean sea, forming a dependency of Jamaica. They are low islands of coral formation, and two of them are barren and uninhabited. Grand Cayman, the largest, is 24 m. long by $2\frac{1}{2}$ broad, is covered with cocoanut trees, and has an anchorage on the S. W. side; pop. about 1,600. The inhabitants are bold sailors, and much employed as pilots. They also catch large numbers of turtles on their shore, to supply the markets of Jamaica.

CAYUGA, a central county of New York, bounded N. by Lake Ontario, W. by Cayuga lake, touching Skaneateles lake on the E., and traversed by the Seneca river and other smaller streams, which furnish abundant water power; area, about 752 sq. m.; pop. in 1870, 59,550. The surface is undulating, the soil fertile; salt, gypsum, and limestone abound. Owaseo lake, 10 m. long, lies in its centre. The Southern Central, the New York Central, and Auburn branch railroads traverse it. The chief productions in 1870 were 622,237 bushels of wheat, 703,148 of Indian corn, 916,168 of oats, 732,140 of barley, 397,747 of potatoes, 87,604 tons of hay, 2,392,238 lbs. of butter, 324,792 of wool, and 96,287 of tobacco. There were 14,453 horses, 21,332 milch cows, 14,256 other cattle, 58,915 sheep, and 14,929 swine. There were 13 manufactories of agricultural implements, 5 of boots and shoes, 1 of carpets, 31 of carriages and wagons, 2 of planes, 24 flour mills, 27 saw mills, 6 manufactories of woollen goods, 13 of iron, 10 brick kilns, 2 manufactories of files, 7 of furniture, 2 of hardware, 1 of saddlers' tools, 11 of ground plaster, 15 of tin, copper, and sheet-iron ware, and 7 of tobacco and cigars. Capital, Auburn.

CAYUGA LAKE, in the central part of New York, separates Cayuga from Seneca county, and extends S. into Tompkins county. It is about 38 m. long, and from 1 to $3\frac{1}{2}$ m. wide, and is navigable in all parts, but for about 6 m. from its N. extremity it is comparatively shallow. On advancing S. it becomes much deeper, and in some places is said to be unfathomable. It is rarely frozen over, except at the shallow portion. Its surface is 146 ft. above Lake Ontario, and 377 ft. above the sea. Its outlet is Seneca river on the north, which connects it with Seneca and Oneida lakes.

CAYUGAS, one of the tribes of the Hotinonsi-ronni or Iroquois, commonly known as the Six Nations. They called themselves Goigogwen or Gweugwen. They inhabited three or four villages in a pleasant district on Cayuga lake. They numbered when first known to the French about 300 warriors, and comprised the three families common to all, Turtle, Bear, and Wolf,

and also the Beaver with the Deer, Snipe, Hawk, and Heron. They gave ten hereditary sachems to the league. As early as 1656 the French, by their missionaries Chaumonot and Menard, attempted to win them over; but though these missions were renewed and continued by Carheil down to 1684, they made little impression on the tribe, which took part in all the wars against the French. In 1667 a part of the tribe, hard pressed by the Susquehannas, crossed over to Quinté bay. Among the great chiefs of the tribe were Saronchiogwa, who became a Christian in 1671, and Oureouhare or Tawerahet, who was taken and sent to the galleys in France, but on his return became a firm friend of the French. During the American revolution they joined the English, having already been in arms against the colonists at Point Pleasant in 1774. They greatly annoyed Gen. Clinton in his march to coöperate with Sullivan in 1779, and soon saw their villages destroyed. After the war they ceded all their land to the state of New York except a small reservation, which they abandoned in 1800. Some joined the Senecas, some went to Grand river in Canada, and others to Sandusky, whence they were removed to the Indian territory. They have now dwindled to about 250.

CAYX, Remi Jean Baptiste Charles, a French historian, born at Cahors in 1795, died in Paris in 1858. He studied in Paris, and became in 1850 rector of the academy of the department of the Seine, after having occupied other important positions as teacher and librarian, and from 1840 to 1845 a seat in the chamber of deputies. His *Récits d'histoire ancienne* (1823) and his *Histoire de France pendant le moyen âge* (1835) passed through many editions; and his other writings include *Histoire de l'empire romain* (2 vols., 1828).

CAZALLA DE LA SIERRA, a town of Andalusia, Spain, in the province and 40 m. N. E. of Seville; pop. about 6,500. It contains numerous religious edifices, ruined villas, and Roman and Arabic antiquities.

CAZEMBE, a negro state in the interior of S. E. Africa, so called from the title of its sovereign. It is situated S. of Lake Tanganyika and E. of Muroque, but its boundaries are not precisely known. Recent travellers estimate the area at 120,000 sq. m., and the population at 500,000. The western part of the country consists of elevated plains. The most important river is the Luapula. The chief articles of trade are slaves, ivory, salt, and copper. The Cazembe resides in Lunda or Lucenda, a large town situated upon Lake Moero, lat. $9^{\circ} 30' S.$, lon. $29^{\circ} 16' E.$ The country was visited in 1831 by Gamito de Tete, a Portuguese. An account of his travels was published at Lisbon in 1854. Livingstone visited the country in 1867.

CAZENOVIA, a town and village on a small lake of the same name in Madison co., New York; pop. of the town in 1870, 4,265; of the village, 1,718. It is the seat of a Methodist

seminary, which in 1871 had 12 instructors, 555 pupils, and a library of 2,500 volumes.

CAZORLA, a town of Andalusia, Spain, on the Vega, in the province and 44 m. E. N. E. of Jaen; pop. about 5,000. It is well built, in the form of an amphitheatre, on the sides of a mountain valley, and contains two spacious squares, one of which is adorned with a fine central fountain. It is defended by two old castles, one of them of Moorish origin, and has in its environs many gardens and public walks. Cazorla figured conspicuously in the Moorish contests of the 13th century. After repeated attempts it was taken and partly burned by the French in 1811.

CAZOTTE, Jacques, a French writer, born at Dijon in 1720, guillotined in Paris, Sept. 25, 1792. He became first known by a prose poem, *Olivier*, somewhat in the style of Ariosto's poems. Soon a number of tales, full of wit and originality, among them *Le diable amoureux* and *Le lord impronptu*, added to his fame. He was endowed with such facility and power of imitation that in one night he wrote a sequel to Voltaire's poem, *La guerre civile de Genève*, and so perfect was the imitation that no one doubted the addition to be Voltaire's own. Cazotte in his later years became one of the most fervent adepts of Illuminism and Martinism. Being a faithful royalist, he was arrested during the revolution, and escaped death in the September massacres through the heroism and entreaties of his daughter Élisabeth, but was soon arrested again, condemned by a tribunal, and executed.

CEAN-BERMUDEZ, Juan Agustín, a Spanish archæologist, born at Gijón, in Asturias, Sept. 17, 1749, died in Madrid, Dec. 3, 1829. He devoted himself early to the study of the fine arts, into which he was initiated by Raphael Mengs. After holding a public office at Madrid, he retired to Seville, where he founded an academy of fine arts, and occupied himself with the study of their history. He was elected a member of the royal academies of history and fine arts at Madrid, and published several valuable works connected with his favorite pursuits, including a *Diccionario histórico de las mas ilustres profesores de las bellas artes en España* (6 vols., Madrid, 1800), and *Noticias de los arquitectos y arquitectura de España* (4 vols., 1829). His most important book, entitled *Sumario de las antigüedades romanas que hay en España*, appeared posthumously in 1832.

CEARÁ, a maritime province of Brazil, bounded N. by the Atlantic ocean, E. by the provinces of Rio Grande do Norte and Parahyba, S. by Pernambuco and W. by Piahy; area, 42,634 sq. m.; pop. about 550,000. The province is divided into two portions by a line of mountains running from the coast, near the capital, S. S. W. to the Serra de Ibiapaba, a narrow range of highlands bordering the W. portion of the province. The S. E. half forms a single basin watered by the Jaguaribe, the most important river in the province, and its affluents;

and the W. half is drained by a host of small rivers all flowing directly into the sea. The coast line is one vast sandy belt of inconsiderable elevation, varying in width from 12 to 18 m.; and the lands beyond, though so low and flat as to remind one of the pampas of the Argentine Republic, are very fertile. Still further westward the face of the country gradually rises toward the mountains, the whole region adjacent to which is made extremely fertile by innumerable springs forming small streams. The climate, moist and tempered by refreshing sea breezes on the coast, is in the interior very hot and dry, although the temperature never rises above 95° F., nor descends below 64°. The rainy season begins about February and lasts till June; the remainder of the year being without rain, all the running streams and rivers dry up, and the want of water is such at times as to oblige the inhabitants to abandon their homes. Among the more important natural productions are quina, ipecacuanha, tatabuba, mahogany, cedar, pao d'arco, carnahuba, and numberless other species of timber and woods valuable for building, dyeing, &c. The caoutchouc tree (*corypha cerifera*, Martins) is so abundant in some parts that Gardner says he "rode for about two days through a forest of almost nothing else. Cotton, coffee, sugar cane, mandioca, maize, rice, some wheat, and other cereals are cultivated; and most varieties of intertropical fruits are exceedingly abundant. The exports consist mainly of cotton, sugar, hides, India rubber, coffee, horns and bones, horse and cow hair, carnahuba wax and half-tanned hides. Ceará has about 100,000 horses and 600,000 head of horned cattle, and considerable cheese is made; but large quantities of butter, cheese, and lard are imported. Much has been done by government to improve the communication with the interior, and a railway from the capital to the great coffee district called Serra de Baturité is now (1873) in process of construction. The mineral productions are amethysts, gypsum, saltpetre, salt, alum, magnesia, carbonate of potassium, amianthus, lignite, gold, copper, zinc, galena, and graphite. Bones, and even perfect skeletons of huge mastodons, megatheria, and other mammals, are abundant in many parts. The capital is Portaleza, and there are seven other small cities.

CEBES, a Greek philosopher, lived in the 5th century B. C. at Thebes in Bæotia. He was a disciple of Socrates, and is introduced by Plato as one of the interlocutors in his "Phædo." He was the author of three dialogues, "The Seventh" (*Ἑβδόμη*), "Phrynichus," and "The Picture" (*Πίναξ*), of which the last only is extant. It presents a picture of human life in the form of a philosophical allegory, and has been translated into almost all the modern languages, even into Arabic. The best editions are those of Schweighäuser (Strasburg, 1806) and of Coraes, in his edition of Epictetus (Paris, 1826).

CEBÚ, or **Zebú**. **I.** An island in the Philippine archipelago, between Bohol and Negros, and between lat. $9^{\circ} 35'$ and 11° N., and lon. 123° and $123^{\circ} 50'$ E. It is a narrow strip of land, stretching N. N. E. and S. S. W.; area, about 2,200 sq. m. It is of uneven surface and stony soil, little suited to agriculture, though there are some valleys of remarkable fertility, yielding cotton, sugar, rice, millet, tobacco, and cacao, the last of which is far superior to that of all the other Philippines. The climate, spite of its excessive heat, which is tempered by alternate land and sea breezes, is delightful and very salubrious. Magalhaens discovered the island in 1521, and induced or constrained the people to embrace Christianity; but he was murdered on the adjacent island of Mactan in the same year. In 1565 Legarpi, the first Spanish governor, resorted to coercive measures to reclaim the apostate natives, who after the death of Magalhaens had relapsed into idolatry; but their final and lasting conversion is due to the disinterested zeal and untiring efforts of Urdaneta, a Spanish priest. **II.** A town on the above island, capital of a province of the same name, comprising the islands of Cebú, Bohol, Mactan, Batayan, Sicjor, and Camotos, situated on the eastern shore of the island of Mactan. The houses are well built of stone, and are in general handsome and spacious. The most noteworthy among the public edifices are the cathedral and the episcopal palace, both of elegant exterior; and there are besides a hospital for lepers and some school houses. The inhabitants comprise three races: the pure-blooded natives, mostly of the Bisayan race, with a few Tagals, though these are mostly confined to Luzon; Europeans; and mestizos descended from the early Spanish settlers and the native women. The mestizos, though extremely industrious, at the head of the commercial interests, and by far the wealthiest class of the three, are yet constrained to live entirely by themselves; and one half of the town, which is pretty equally divided by a stream or small river, is exclusively occupied by these half-castes, who are held in utter aversion by the pure-blooded races, foreigners as well as natives. Cebú is the seat of a bishopric, which has under its jurisdiction 13 of the 35 provinces comprising the Spanish Philippines, and of the civil and military authorities of the province. The town carries on a considerable trade, chiefly with Manila.

CECCO D'ASCOLI, an Italian savant and martyr, whose real name was **FRANCESCO** (of which Cecco is a diminutive) **STABILI**, born at Ascoli in 1257, died in Florence, Sept. 16, 1327. He taught astrology, philosophy, and mathematics, and to escape from penalties imposed upon him by the inquisition for his alleged heterodoxy, he went in December, 1324, to Florence, where however he was handed over to the secular courts as a heretic and sentenced to die at the stake. It has been asserted that he had been for some time physician to Pope John

XXII.; that from having been a friend of Dante he became an adverse critic of his writings and of those of Guido Cavalcante; and that the admirers of the illustrious poet joined the inquisitors who clamored for his death. But there is no conclusive authority for these and other statements in regard to him, excepting in respect to the circumstances attending his death. He possessed an extraordinary amount of information for his day, as attested by his principal work, *L'Acerba*, a kind of poetic cyclopædia, in four parts, devoted to the sciences and to ethics, and finished only to the beginning of the fifth part, which he had reserved for theology. His writings were chiefly founded upon personal observations and experiments, and foreshadowed even the principle of the circulation of the blood. The work passed through 20 editions from the time of its first appearance (about 1473) to about 1523, the least imperfect being that of Venice, 1510.

CECIL, a N. E. county of Maryland, bordering on Pennsylvania and Delaware, and situated at the head of Chesapeake bay, which forms its S. W. boundary; area, about 300 sq. m.; pop. in 1870, 25,874, of whom 4,014 were colored. Several bays indent it. Its W. border is washed by the Susquehanna, and Sassafras river bounds it on the south. The surface is slightly uneven and the soil fertile. At Port Deposit are immense granite quarries, and the county also contains gneiss, slate, iron, chrome, and sulphate of magnesia. It is intersected by the Philadelphia, Wilmington, and Baltimore, the Port Deposit branch, and the Philadelphia and Baltimore Central railroads. The chief productions in 1870 were 365,818 bushels of wheat, 683,683 of Indian corn, 305,307 of oats, 110,839 of potatoes, 19,986 tons of hay, 445,720 lbs. of butter, and 14,102 of wool. There were 4,824 horses, 5,797 milch cows, 7,471 other cattle, 4,579 sheep, and 9,716 swine. There were 21 flour mills, 1 manufactory of cotton goods, 7 of iron, 4 of paper, 2 of sashes, doors, and blinds, 5 saw mills, and 4 manufactories of woollen goods. Capital, Elkton.

CECIL, Robert, earl of Salisbury, an English statesman, son of Lord Burleigh by Mildred, his second wife, born about the middle of the 16th century, died at Marlborough, May 24, 1612. He was of weakly constitution and deformed in person, but gifted with great acuteness and energy. On his election to parliament as member for Westminster, his abilities attracted the notice of Queen Elizabeth, who attached him to the French mission, and subsequently appointed him assistant secretary of state. The earl of Essex was at this time the queen's favorite. His influence and that of the Cecils, father and son, continually came into collision; consequently a rivalry sprang up between them, which continued, openly or secretly, until Essex perished on the block. In 1590 Secretary Walsingham died. Essex demanded the office for a nominee of his own, while Burleigh requested it for his son Robert.

The queen, unwilling to offend her favorite, left the appointment open, and Cecil was not installed as principal secretary of state till 1596. While Essex was absent on the second Spanish expedition, Cecil contrived to procure for himself the chancellorship of the duchy of Lancaster, which the earl had requested for a friend. That quarrel was however made up, and Cecil, being sent to France, much against his will, to negotiate a peace between Henry IV. and the Spaniards, deemed it an effectual way of tying his rival's hands to confide the secretaryship to him during his own absence. Essex discharged the trust honorably. Cecil's first act on his return was to thwart Essex in his attempt to obtain the deputyship of Ireland for Sir George Carew, an incident which brought about the celebrated quarrel in which Elizabeth boxed her favorite's ears and told him to "go to the devil." Essex's fall was rapid, and Secretary Cecil was soon relieved from his rivalry. He is accused of having in like manner sacrificed Sir Walter Raleigh, while professing to be his friend. On the death of his father he was made premier. Elizabeth placed confidence in his great ability, and he was at all times ready in appearance to sacrifice his own views to the "divine judgment of his sovereign." Yet in reality he endeavored with success, both in Elizabeth's reign and that of her successor, to restrain the power of the crown. Having secretly favored the interests of James I., he was rewarded by that sovereign on his accession by being continued in office, and by being created in 1603 baron of Essendine, in 1604 Viscount Cranborne, and in 1605 earl of Salisbury. In 1608 he succeeded Dorset as lord high treasurer, notwithstanding the exertions of his new rival, but former friend, Henry Howard, earl of Northampton, to obtain the office. When the gunpowder plot was found to be no fiction, he entered actively into the detection of the conspirators. A work of his is extant, entitled "A Treatise against Papists." James had the highest opinion of his sagacity in discovering plots, and called him on that account by the familiar appellation of "my little beagle." He could not be brought, however, to assent to James's project for the incorporation of the two kingdoms. In all other matters the king followed his lead, asking nothing in return but money to carry on his extravagant expenditure. Thus the whole cares of the government were thrown on his shoulders. James had no order in his expenditure. The ordinary revenues being insufficient to meet his wants, imposts were laid on articles of commerce by proclamation. The country denied the constitutionality of this proceeding, but the court of exchequer decided in favor of the king. Cecil interposed between the king and the people. He asked, in conference of the two houses of parliament, that an immediate subsidy should be voted to liquidate the royal debt, and that an addition of £200,000 be made to the annual

income, to prevent the recurrence of a similar exercise of the king's prerogative. Parliament retorted on the king by a demand for numerous reforms. After protracted conferences, both houses adjourned without granting the required supplies. The failure of his proposition was a source of bitter mortification to the treasurer. His health sank under a complication of disorders. Having tried the mineral waters of Bath without benefit, he set out for London, but died on the way. Lord Hailes published "Secret Correspondence of Sir Robert Cecil with James VI. of Scotland" (12mo, 1766).

CECIL, William. See BURLEIGH, LORD.

CECILIA, Saint, a Roman lady of high descent, born about the middle of the 2d or the commencement of the 3d century. Compelled by her parents to marry Valerian, a noble youth of Rome, although she had at an early age made a vow to consecrate her life to religion, she was eventually doomed to suffer martyrdom; and her husband, her brother-in-law, and another Roman, whom she is believed to have converted, were supposed to have met with the same fate. St. Cecilia is the chosen patroness of musicians, and from her skill in singing is especially regarded as the patroness of sacred music. St. Cecilia's day, Nov. 22, is annually celebrated in England by a musical festival. Several churches were built in her honor at Rome. Beautiful pictures of the saint were executed by Raphael and other celebrated painters, and Père de Brailion of the Oratoire published in 1668 a work entitled, *La sépulture admirable de Sainte Cécile dans son église de Rome*.

CECROPS, first king of Attica, said to have reigned about 1550 B. C., and represented in the ancient legends as the civilizer of that country. He founded Cecropia, which at a later period became the Acropolis of Athens, and several other places; divided Attica into 12 communities; taught its inhabitants morality and manners, marriage, and the worship of the gods; abolished bloody sacrifices, and introduced agriculture, navigation, ship building, and the culture of the olive. According to some he was of Pelasgian origin, while others say he was the leader of an Egyptian colony from Sais. He reigned 50 years. His merits were commemorated by a monument in the temple of Minerva, in favor of which goddess he is said to have decided a dispute with Neptune concerning the possession of Attica. He was also worshipped in the constellation of Aquarius. In sculpture he was represented as half man half woman, or half man half serpent; hence he is sometimes styled *διπλῆς*, twofold.

CEDAR, the name of several species of evergreen trees of the order *conifera*, the principal of which are the cedar of Lebanon (*pinus cedrus*, Linn.), the cedar of Goa (*cupressus Lusitanica*, Linn.), the Indian cedar (*pinus deodora*, Lambert), the white cedar (*cupressus thyoides*, Linn.), and the red cedar (*juniperus Virginiana*,

Linn.).—The cedar of Lebanon, or cedar larch, is a native of the coldest parts of Mt. Lebanon and the range of the Taurus, and from its superior magnificence became with Scripture

counted here 28 cedars; Rauwolf, in 1574, found 24, and two others the branches of which were decayed through age; De la Roque, in 1588, found 20; Maundrell, in 1696,



Cedars of Lebanon.

writers a favorite emblem for greatness, splendor, and majesty. The durability and fragrance of its wood caused it to be sought for costly buildings, as the palace of David and the temple of Solomon. Though it formerly covered

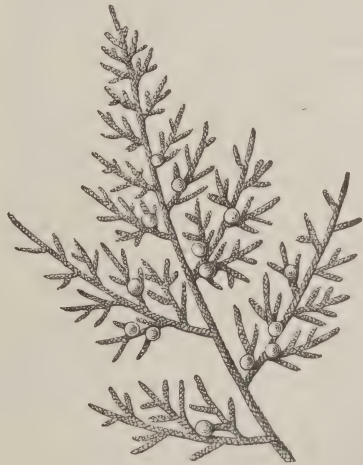
16; Pococke, about 1740, counted only 15. Graham measured 12 trees whose circumference was from 22 to 40 ft., the largest trees having a diameter of about 16 ft. Around these there is a grove of several hundred smaller trees, apparently of a different species of cedar. See-tzen, Ehrenberg, Berggren, and Bové have described other groves. Henry H. Jessup, an American missionary in Syria, in 1867 described eleven distinct groves of cedars, five

in northern and six in southern Lebanon.—The cedar of Goa is found wild in parts of India and Japan, and has been naturalized in Portugal around Cintra. It is the handsomest tree of the genus *cupressus*, and distinguished by its abundance of long dichotomous pendent branchlets.—The Indian cedar is a large tree found wild on the mountains of Nepal and Thibet, at a height of about 10,000 ft. above the sea. Its timber possesses the qualities attributed by the ancients to the cedar of Lebanon, being compact, resinous, and fragrant. It is much used for building in India, and has been introduced into



Cones of Cedar of Lebanon.

Lebanon with dense forests, so that fourscore thousand hewers were employed by Solomon in obtaining timber from them, yet the destruction of the trees for architectural purposes was more rapid than their growth, and in the 6th century Justinian found it difficult to procure cedar timber enough for the roof of a single church. At present they appear to be confined to a few localities, the most frequently visited among them being a valley in the Lebanon range, about 15 m. from the sea, at an elevation of 6,000 ft. Belon, in 1550,



Red Cedar.

England as an ornamental tree.—The white cedar is an abundant tree in swamps in the United States southward from Massachusetts and Ohio, reaching a height of from 30 to 70

ft. It has a fibrous, shreddy bark; leaves of a dull, glaucous-green color, very small and scale-like; and an exceedingly durable wood of a reddish color. Every part of the tree is strong-scented. It is used as a material for fences, and is in the highest esteem for shingles and coopers' staves.—The red cedar is a native of North America, the West Indies, and also Japan, and attains a height of from 15 to 30 ft. Its wood is odorless, of a bright red color, very compact and durable, and offensive to most insects. It is much used for the purposes of the cabinetmaker and for the outsides of black-lead pencils.—In California several varieties of the cedar attain an immense size.

CEDAR. I. An E. county of Iowa, intersected by Cedar and Wapsipinicon rivers; area, 576 sq. m.; pop. in 1870, 19,731. Cedar river, from which the county is named, flows through a narrow pass in the W. part, on either side of which its rocky banks rise perpendicularly to a great height. The surface is diversified by fertile undulating prairies and woodlands. The S. W. corner is touched by the Chicago, Rock Island, and Pacific railroad, and the Chicago and Northwestern railroad passes through it. The chief productions in 1870 were 632,878 bushels of wheat, 2,203,802 of Indian corn, 723,312 of oats, 141,182 of barley, 92,937 of potatoes, 20,916 of flax-seed, 38,820 tons of hay, 28,656 lbs. of cheese, 741,650 of butter, and 35,087 of wool. There were 8,553 horses, 9,194 milch cows, 15,403 other cattle, 7,481 sheep, and 31,898 swine. There were 8 manufactories of carriages and wagons and 6 of saddlery and harness. Capital, Tipton. **II.** A N. E. county of Nebraska, separated from Dakota on the N. E. by the Missouri river, and watered by its affluents and those of the Elkhorn; area, 650 sq. m.; pop. in 1870, 1,032. The surface is diversified, the soil fertile. The chief productions in 1870 were 24,555 bushels of wheat, 16,900 of Indian corn, 11,875 of oats, 12,190 of potatoes, and 3,214 tons of hay. There were 224 horses, 557 milch cows, 1,324 other cattle, and 752 swine. Capital, St. James. **III.** A S. W. county of Missouri, intersected by Sac river; area, 435 sq. m.; pop. in 1870, 9,474, of whom 111 were colored. Its surface is uneven, the soil productive. A railroad connects it with Fort Scott, Kansas, and with the Atlantic and Pacific railroad at Lebanon. The chief productions in 1870 were 59,377 bushels of wheat, 326,060 of Indian corn, 49,588 of oats, 17,070 of potatoes, 1,102 tons of hay, and 37,465 lbs. of tobacco. There were 3,089 horses, 2,347 milch cows, 5,680 other cattle, 7,750 sheep, and 11,774 swine. Capital, Stockton.

CEDAR BIRD (*bombycilla cedrorum*, Vieill.; *ampelis cedrorum*, Baird), a bird of the waxwing family, smaller, more southern, and less migratory than the *A. garrulus*, Linn. (See WAXWING.) The general color is reddish olive, passing into purplish cinnamon anteriorly, ashy behind, and yellow below; chin black; under

tail coverts white, but no white on the wings; in other respects like the waxwing. It occurs throughout North America, from Canada to Central America; it is usually seen in flocks,



Cedar Bird (*Bombycilla cedrorum*).

flying high and rapidly. The food consists of berries and small fruits of all kinds, which it eats to repletion and sometimes to its destruction; it takes its name from its fondness for the berries of the red cedar; it also eats insects. It is a handsome and sprightly bird, but has no song. It becomes very fat in summer and autumn, and is then highly esteemed as food in the southern states. It breeds in June, making a nest of grass in orchard and cedar trees; the eggs are three or four, purplish white with black spots. A species in Japan has no red appendages on the wings.

CEDAR CREEK. See supplement.

CEDAR MOUNTAIN, an isolated conical hill in Culpeper co., Virginia, near which was fought, Aug. 9, 1862, a sharp action between a Union force under Gen. Banks, belonging to the army of Virginia under Gen. Pope, and the confederates under Gen. Jackson. Toward evening Gen. Banks fell back to meet supports which Gen. Pope had pushed forward. The confederates retained possession of the battle field, but two days afterward fell back to Gordonsville, toward which Gen. Lee was moving with his whole army. The confederate loss was 223 killed; 1,060 wounded, and 31 missing; total, 1,314. The Union loss was about 1,400 killed and wounded, and 400 prisoners, besides many stragglers who never returned to their commands.

CEDAR SPRINGS, a post village of Spartanburg co., S. C., 5 m. E. S. E. of Spartanburg. It is an old watering place, and the seat of a deaf and dumb asylum, which in 1871 had two instructors and 15 pupils. The Spartanburg and Union railroad passes through the village.

CEDRON, a medicinal extract from the seeds of *simaruba cedron*, a small tree of the order *simarubaceae*, growing in Colombia and Central America. The whole plant appears to be impregnated with a bitter principle, al-

though the seeds only are used. Its action on the system appears to be that of a pure bitter. (See BITTER PRINCIPLES.) Antiperiodic virtues are claimed for it when given in larger doses than the ordinary ones of one or two grains. For nearly two centuries it has had a great reputation in its native country as a remedy for the bite of serpents and for the prevention of hydrophobia. It is applied both internally and locally.

CEFALU (anc. *Cephalædis*), a fortified seaport town of Sicily, on the N. coast, in the province and 39 m. E. S. E. of Palermo; pop. about 12,000. It is the seat of a bishopric, and contains a fine cathedral and several other churches. The remains of a Phœnician edifice, a castle built by the Saracens, and several marble quarries are in the vicinity. Sea fishing is prosecuted with great activity. The port is capable of receiving only a small number of vessels.

CEHEJIN, a town of Spain, on the Caravaca, in the province and 35 m. W. by N. of Murcia; pop. about 6,200. It contains numerous handsome houses built of marble from the neighboring quarries, and has manufactories of paper, cloth, soap, and pottery, oil and brandy distilleries, and commerce in wine, fruits, grain, wool, hemp, flax, and cotton.

CELLIER, Dom Rémi, a French theologian, born at Bar-le-Duc in 1688, died at Flavigny, Burgundy, Nov. 17, 1761. He was a member of the Benedictine order, president of the congregations of St. Vannes and St. Hydulphe, and prior of the abbey of Flavigny. His principal work, *Histoire générale des auteurs sacrés et ecclésiastiques* (24 vols., Paris, 1729-'82; new ed., 8 vols., 1858), is celebrated for accuracy and good judgment.

CELAKOVSKY, or Czelakowsky, Frantisek Ladislav, a Bohemian poet and philologist, born at Strakonitz, March 7, 1799, died in Prague, Aug. 5, 1852. He studied at Pisek, Linz, and subsequently at Prague, where he became interested in the Czech language. In 1821 he became instructor in the family of Count Chotek, which left him time for literary pursuits, and he published "Poems" (Prague, 1822; new ed., 1830), "Slavic National Songs" (3 vols., 1822-'7), and a metrical translation of Scott's "Lady of the Lake" (1828). In 1828 he became associate editor of the "Quarterly Review for the Catholic Clergy," and in 1829 published a translation of Russian national songs, which occupies a high place in Bohemian literature. When the Polish insurrection broke out in 1830 he sympathized with Russia; but after the insurrection was suppressed he wrote an article in the "Bohemian Gazette," of which he had become editor, in which he denounced the severity of the Russian government against Poland. In consequence of this article he was deprived of his post as editor of the "Gazette," and also of that of professor of Bohemian literature in the university of Prague, to which he had been appointed. He then became librarian of

Prince and afterward of Princess Kinsky, and in 1842 professor of Slavic languages and literature at the university of Breslau. In 1848 he returned to Prague, where in the following year, as an act of concession toward the Czech nationality, he was appointed by the Austrian government professor of Slavic philology. One of his latest works was the "Popular Philosophy of the Slavic Nations in their Proverbs" (Prague, 1851). He was engaged from the year 1835 in a comparative study of all the Slavic dialects, and parts of its results were published in the form of additions to Jungmann's Czech dictionary.

CELANDINE (*chelidonium majus*), a plant of the order *papaveraceæ*, indigenous in Europe, but never wild in this country. It is one or two feet high, bears pinnate leaves and small peduncled umbels of yellow flowers, and when wounded emits a yellow, opaque juice. It contains several peculiar acid and alkaline principles, one of which, chelerethrine, is probably



Celandine (*Chelidonium majus*).

identical with the active principle of bloodroot, a plant to which celandine is botanically allied. Chelerethrine, which receives its name from the intensely red color of its salts, appears to be an acrid narcotic poison. The whole plant is an acrid purgative. The juice is exceedingly irritant, and when applied to the skin produces inflammation and even vesication. It was formerly esteemed in jaundice, in which affection it may have been useful on account of its purgative properties, although it is not improbable that its reputation was largely founded upon the color of its juice. This is applied locally in some skin diseases, and the whole plant is used externally in the south of Europe as a vulnerary. Its real value is probably not greater than that of many other violent purgatives and irritants.

CELEBES, an island of the Malay or East Indian archipelago, under the control of the Dutch, situated E. of Borneo, and like that

island crossed by the equator. It lies between lat. $1^{\circ} 50' N.$ and $5^{\circ} 30' S.$, and lon. 119° and $125^{\circ} E.$, and is bounded N. by the Celebes sea, E. by the Molucca passage and Banta sea, S. by the Flores sea, and W. by Macassar strait, which separates it from Borneo by an average distance of 120 m., though the breadth of the strait is only about 60 m. at the narrowest part. The outline of Celebes is exceedingly irregular, and has been compared to the form of a huge grasshopper. The island is perhaps best described as a nucleus with its centre on the 120th meridian, $2^{\circ} S.$ of the equator, whence radiate four peninsulas: one northward along the 120th meridian to about lat. $1^{\circ} N.$, and thence easterly and northerly about 380 m. to near lon. $125^{\circ} E.$, which is sometimes called the Menado peninsula, and terminates at Cape Polesan in the province of Minahasa; one eastward, known as the Balante peninsula, 182 m. in length, and separated from the preceding by the gulf of Tomini or Gorontalo; one in a southeasterly direction to a distance of 170 m., called the Tabunku peninsula, with the Tolo gulf lying between it and Balante; and one southward, W. of the Boni gulf, which also washes the W. shore of the Tabunku peninsula, to the southernmost extremity of the island, including the Dutch settlement of Macassar. The maximum length of Celebes from N. to S. lies along the 120th meridian, and is nearly 500 m. The greatest distance from E. to W., measured along the northern peninsula, is not far from 300 m. There are about 2,600 m. of seacoast. Wallace says the size of Celebes is about equal to that of Ireland; by the Dutch and other authorities its area is stated to be upward of 70,000 sq. m., or more than twice as great. The population was formerly estimated at between 2,000,000 and 3,000,000, but probably does not exceed 1,000,000.—The interior of Celebes is elevated and generally mountainous, but nowhere volcanic except near the eastern end of the northern peninsula, in a district which it has been conjectured was once a separate island. Each peninsula is traversed by a range of mountains, the loftiest summit in Celebes being Lompo-Batang, near Macassar, 8,200 ft. high. The prevailing rock in this part of the island is limestone, resting on basalt. A considerable thickness of vegetable mould is found even on the hill tops and steeper mountain slopes. There are 11 volcanoes in Minahasa, and earthquakes are of frequent occurrence there. The principal volcanic peaks are Mt. Klabat, 6,560 ft.; Mt. Lokon, 5,140 ft.; Mt. Sudara, "the Sisters," consisting of twin cones, of which the highest is 4,390 ft.; and Batu Angus, in Malay "the Hot Rock," which is in fact a volcano with its top blown off, and has an elevation of 2,290 ft. The rocks of this region are trachytic lavas, volcanic sand and ashes, pumice stone, and conglomerates. The decomposition of volcanic products has rendered whole districts prodigiously fertile. Hot springs and miniature volcanoes which emit boiling mud exist in this

portion of Celebes.—The largest river of the island is the Chinrana, which flows from Lake Labaya a distance of 53 m. into the Boni gulf. The lake, which is also called Sedenveng, is in the country of the Bughis, whose boats throng its waters. It is 24 m. long, 13 m. wide, and varies in depth, according to the season, from 32 to 60 ft. In Minahasa, the lower part of an elevated plateau is occupied by a beautiful lake called Tondano, at a height of 2,272 ft. above the level of the sea. It extends about 17 m. in a northerly and southerly direction, and is from 2 to 7 m. wide. Its greatest depth is 74 ft. A stream of considerable size known as the Boli enters the sea on the N. coast, and on the W. coast, S. of Macassar, is the mouth of another river. The island is for the most part well watered by small streams.—The natural history of Celebes presents some striking peculiarities. The island is not only remarkable for the individuality of its animal productions, but also for the absence of groups found elsewhere throughout the region of zoological distribution of which it is the geographical centre. Wallace says that in order to account for the number of animal forms possessed by Celebes which show no relation to those of India or Australia, we must assume that it is one of the oldest parts of the archipelago, and dates from a period when the land that constitutes Borneo, Java, and Sumatra had not risen above the ocean. Of the 14 species of terrestrial mammalia, 10 are peculiar to the island, a lemur, a deer resembling a Javan species, and the common Malay civet being met with elsewhere as well. Among those which are distinctive, the most noteworthy is the sapi-utan or wild cow of the Malays (*anoa depressicornis*), which frequents the mountains only, and is described as a creature resembling the ox-like antelopes of Africa. The other mammalian species peculiar to Celebes are: a black baboon-like monkey (*cynopithecus nigrescens*), with a tail scarcely long enough to be visible; a peculiar wild hog; five species of squirrels; and two species of eastern opossums. Seven species of bats are known to exist. The island is the chief habitat of the babyroussa. Of birds there are 191 species, 128 of which are land birds, and 80 strictly confined to Celebes. They comprise hawks, crows, parrots, owls, woodpeckers, cuckoos, bee-eaters, hornbills, fly-catchers, starlings, pigeons, and the curious maleo (*megacephalon rubripes*), a gallinaceous bird allied to the Australian brush turkey. Pythons and other serpents are very numerous, the former attaining a length of 15 ft. Insect life is abundant, the number of peculiar species being large. Millipeds 8 and 10 inches long frequent houses in the rainy season.—The uncultivated portions of Celebes are covered with forest, abounding in the luxuriant vegetation of an equatorial climate, such as pandani, tree ferns, the wild jackfruit tree, and palms, including the cocoanut, the betelnut, the sago, the sugar palm (*arenga saccharifera*), and the gomuti palm, the

fibres of which are manufactured by the natives into a sort of coarse rope called coir. The fruits of Celebes are bananas, breadfruits, durians, lansiums, limes, mangosteens, oranges, pineapples, pompelmuses or shaddockes, and those already referred to. Rice and coffee are the most important agricultural productions. Cacao, cotton, maize, and tobacco are also raised, the last named only for home consumption. Rice can be profitably cultivated up to an elevation of 4,500 ft., and coffee between that and an altitude of 1,000 ft. above the sea level. The annual yield of the Dutch government coffee plantations on the table lands of Minahasa is about 5,000,000 lbs. The coffee raised here is superior to any from Java, and commands a higher price. Gold occurs in very considerable quantities, not only throughout the whole northern peninsula, but also near the southern extremity of the island, S. of Macassar. It is sold by the native chiefs to the Bughis, who pay for it more liberally than the Dutch. The iron ore of the island is of a superior quality, and tin and copper are also found.—The native inhabitants of Celebes are in part governed by their own kings, but these are dependent upon the Dutch government. All appear to belong to the Malay race. The Bughis constitute the most numerous and active portion of the population, and are famed as sailors and traders throughout the archipelago, every important island of which is visited by their light vessels known as praus. They occupy that part of the S. W. peninsula lying between lat. 3° 30' and 5° S. They are one of the four true Malay tribes, Mohammedans in religion, and speak the Bughis and Macassar languages, for which they have two different written characters. The Bughis sailors are wild and ferocious in appearance, but of quiet and peaceable disposition. The aborigines of northern Celebes are classed with the savage Malays, although the civilizing influence exerted by the Dutch since the introduction of coffee cultivation in 1822 has greatly promoted their advancement. They are short in stature, of light-brown complexion, with projecting cheek bones, and have long, straight, black hair. Up to a comparatively recent period they were addicted to head-hunting like the Dyaks of Borneo, and even to cannibalism; but they are obedient servants, gentle and industrious, and readily assume the manners and habits of civilized life. A people called the Mandhars dwell in the most western part of the island, N. of Macassar. Menado, the Dutch capital of the northern portion of the island, is a free port and town of 2,500 inhabitants, on the Celebes sea. Kema is a place of 2,000 inhabitants on the opposite shore, used as the port of the province during the prevalence of the western monsoon, which renders Menado difficult of access for ships. Macassar or Vlaardingen, the chief Dutch town on the island, in lat. 5° 9' S., lon. 119° 36' E., is a fortified free port, with good anchorage, and carries on a considerable trade with China,

especially in tripang or sea slugs, of which the yearly exports are valued at \$600,000. Other articles of export from Celebes, in addition to coffee and rice, comprise tortoise shell, which is abundantly obtained on the coasts, Macassar horses, which are sold in Java, and variegated mats.—The first mention of Celebes by any European writer is believed to be in a work by the Portuguese historian De Barros, who lived in the 16th century and wrote an account of the conquests of his countrymen in the East Indies. According to this, the island was discovered in 1525 by Portuguese from the Moluccas, who sought *si labih*, "still more" gold and spices than they had already found. Touching at the points of two peninsulas, they believed they had visited two islands, and so described the discovery in their report as *as ilhas Cellesbes*, a designation which has remained substantially unchanged. This name, however, is not known to the natives, who generally call the country Negri Bughis, or Bughis land. The conversion of the more advanced tribes of the island to Mohammedanism was effected a few years after the arrival of the Portuguese, in spite of the efforts of their Christian missionaries. The first intercourse of the Dutch with the island was in 1607. They expelled the Portuguese from the Macassar country in 1660, and establishing themselves on the island maintained their position there until expelled by the British in 1811. Their possessions were restored to them by the treaty of 1815.

CELERES, in Roman antiquity, a body guard instituted by Romulus, composed of 300 young men of the most illustrious families. They were elected by the suffrages of the 30 curiæ, each of which furnished 10. The name has been derived by some from the name of their first chief, but more probably was given to them in allusion to the rapidity with which they executed their orders. Their commander was called the tribune of the celeres, and was, after the king, the highest officer in the state. This office was held by Brutus when he expelled the Tarquins from Rome. The celeres are thought by Niebuhr to have been the patricians in general, so called because they could keep horses or fought on horseback, and thus to correspond with the later *equites* or knights.

CELERY (*apium graveolens*, Linn.), an umbelliferous plant chiefly cultivated for salad. In its wild state, in which it is found in ditches throughout Europe, it is rank, coarse, and even poisonous; but by cultivation in gardens it becomes sweet, crisp, juicy, and of an agreeable flavor. Its green leaves, stems, and seeds are used in soups, and the blanched stalks either in that way, or more usually as a salad. One variety, called the celeriac, is raised only for the root or base of the leaves, which becomes a white, solid bulb. Celery requires a deep, rich, well drained soil. The seed is sown in a bed, from which the plants are transferred to another when they are 2 or 3 inches high. At 8 or 12 inches' height they are transferred for

blanching to trenches which are nearly a foot in depth. The plants are repeatedly earthed up till they have risen two feet or more above the



Celery (*Apium graveolens*).

natural surface. Celeriac is not blanched, but grows openly, exposed to the light.

CÉLESTE, Madame, an English dancer and actress, born in Paris, Aug. 16, 1814. Though of French parentage, and a pupil of the conservatory of the then royal academy of music, she has been connected from her earliest life with the English and American stage. In her 15th year she came to the United States, where she married Mr. Elliot; but her husband soon dying, she left for England, and in 1830 made her first appearance in Liverpool as Fenella in *Masaniello*. She soon became very popular, especially in London, as Matilda in the "French Spy." In 1834-'7 she again performed in the United States, where she acquired a considerable fortune. In 1837 she first appeared as an actress at Drury Lane and the Haymarket theatres, London, and in 1838-'40 in the United States. In 1843 she joined Mr. Webster in the management of a theatre at Liverpool, and in 1844 of the Adelphi in London; and subsequently she was the lessee of the Lyceum till about 1861, having revisited the United States in 1851-'3, where she appeared again in 1865, still displaying undiminished histrionic power. Her most popular parts were Miami in the "Green Bushes," Miriam, and the Woman in Red. She returned to England in 1868, and retired from the stage Oct. 22, 1870.

CELESTINE, the name of five popes. **I. Saint**, a Roman, died April 6, 432. He was related to the emperor Valentinian II., was created cardinal deacon by Innocent I., and succeeded Pope Boniface, Nov. 3, 422. The heresy of Nestorius induced him to convoke the council of Ephesus in 431, at which there were 200 bishops assembled, and which was presided over by his three legates. Celestius, the chief

of the Pelagians, having retired into Britain, he sent missionaries there, who in the space of two years brought back that country to the faith. Shortly after this he sent Palladius to Scotland, and St. Patrick to Ireland. Some epistles of this pope have been preserved, but those written to the bishops who had taken part in the election of Nestorius and to Eugenius have been lost. **II. Guido di Castello**, a disciple of Abélard, died March 8, 1144. He was created cardinal priest by Honorius II., and made governor of Benevento by Innocent II., at whose death he was elected pope, Sept. 26, 1143. As soon as he had ascended the pontifical throne he received ambassadors from Louis VII., who came to supplicate peace, and also absolution from the ecclesiastical censures under which the kingdom had been laid by his predecessors. The pope granted their request in the presence of the nobles of Rome. He held the see five months. Only three epistles of his are extant. **III. Giacinto Orsini**, born in Rome in 1106, died Jan. 8, 1198. He was created cardinal by Honorius II., and elected pope when past 80 years of age, March 30, 1191. The day after his consecration he crowned the emperor Henry VI. and his empress Constance. After the coronation the emperor restored to the pope the city of Tusculum, which the latter gave to the Roman citizens, who, to avenge some former disputes, destroyed it. He afterward excommunicated the emperor, because he kept Richard Cœur de Lion in prison. Among other noteworthy events of Celestine's pontificate was his confirmation of the Teutonic military order in 1192. **IV. Goffredo Castiglione**, of Milan, elected pope, Sept. 20, 1241, died Oct. 8, 1241. He was appointed canon and chancellor of his native city, and afterward became a monk in the monastery of Altacomba. In 1227 Gregory IX. created him cardinal, and sent him as legate into Tuscany, and after this to Lombardy and to Monte Casino, where he found the emperor Frederick II. preparing to send succors to the Holy Land. Advanced in years at the time of his election, and with health much impaired, he died without having received consecration, and without having published any bull. **V. Pietro Angelerier**, born at Isernia, in Naples, died May 19, 1296. He was known as Pietro da Murrone, from a mountain near Sulmona, where he led a solitary life. When 17 years old he became a Benedictine monk in the monastery of Faifoli, in the diocese of Benevento. After performing extraordinary penances for many years, he went to Rome, where he was ordained priest in 1239. Having spent five years at Murrone, he afterward removed to Mount Majella, near Sulmona, where he lived with two other priests in a large cavern. He fasted every day except Sunday, and observed four Lents in the year, living on bread and water, working and praying during the entire day and most of the night. About 1254 he founded the religious order called Celestins, which prospered so much during his lifetime

that it consisted of 600 monks and 36 monasteries. This order was approved by Urban IV., who incorporated it with the Benedictine order. Gregory X. confirmed it in 1274, in the second general council of Lyons. It spread throughout Italy, France, and Germany, and was suppressed in 1778. Pietro was elected pope July 5, 1294, after an interregnum which followed the death of Nicholas IV. The account of his election being forwarded to him in his retirement, he refused to accept the dignity, though the cardinals and Charles II. of Naples and Andrew III. of Hungary urged him strongly to do so. He attempted to fly from his retreat, but was prevented by a vast concourse of people. At length he consented, and proceeded to Perugia accompanied by the kings of Naples and Hungary, and was crowned Aug. 29. He made his public entrance into the city amid the applause of more than 200,000 people. In the city of Aquila he appointed twelve cardinals, five of whom were Italians and seven French, and then went to Naples. He made two constitutions which provided for the cardinals entering into conclave on the election of a pope, thus renewing a constitution already made by Gregory X. in the council of Lyons; and also another respecting the pope resigning his office. After occupying the pontifical see during five months, he renounced the tiara, Dec. 13, 1294, on finding that he was but little acquainted with temporal matters, and still retained his unconquerable love for solitude. The see remained vacant ten days, when Boniface VIII. was elected his successor. Celestine then retired again to his solitude at Majella, to devote himself altogether to prayer and to mortification. Boniface VIII., fearing difficulties might be caused by artful persons, who would turn his simplicity to their own account, wished to keep him under his control, and at first confined him in a house in Anagni near his own residence, and afterward transferred him to Fumone, near Ferentino in the Campagna, where he languished for ten months in a climate so sickly that the religious who waited on him were obliged to be changed every two months. He finally died there, and was canonized at Avignon by Pope Clement V., May 5, 1313. He wrote the following treatises, which were published at Naples in 1640: *Relatio Vitæ suæ*; *De Virtutibus*; *De Vitiis*; *De Hominis Vanitate*; *De Exemplis*; *De Sententiis Patrum*. Several lives of this pope have been written; among them one by Lelio Marini (Milan, 1630).

CELESTINS. See CELESTINE V.

CELIBACY (Lat. *calebs*, unmarried), the state of being unmarried, whether the person be a bachelor or a widower, a maid or a widow. In its restricted and more usual sense, it means the state of those who have formally renounced matrimony for the future, especially by a religious vow. In ancient Greece and Rome celibates, outside of the priesthood, were subjected to various penalties. In Sparta un-

married men were regarded as infamous, and by the laws of Lycurgus might be seized and severely punished by the women in the temple of Hercules. Plato, in his imaginary republic, declared all those who had remained unmarried till they were 35 years old to be incapable of holding any public office. At Rome celibates were forbidden to bear witness in courts, or to leave a will, and it was believed that special penalties were reserved for them in the future life. It is remarkable that while celibacy was proscribed in Europe, it was authorized in the East. There celibates bore honorable names, were raised to high positions, and styled favorites of heaven. With the progress of civilization in Greece and Rome celibacy became more common. Thus often the men of letters, the philosophers, athletes, gladiators, and musicians, some from taste, and some from necessity, remained unmarried. This was frequently the case with the disciples of Pythagoras and Diogenes. Celibacy was early regarded as a peculiar privilege and duty of the priesthood. Among the Hebrews, persons intended for the service of the temple were permitted to marry, but under certain restrictions. Among the Egyptians, the priests of Isis were bound to chastity. The gymnosophists of India and the hierophants of the Athenians lived in celibacy. There were maidens among the Persians consecrated to the worship of the sun, and vestal virgins among the Romans, who alone were permitted to guard the sacred fire. The celibacy of religious persons was regarded by the Greeks as a grace almost divine. No sacrifice was regarded as perfect without the intervention of a virgin.—In the primitive Christian church celibacy came gradually to be esteemed a higher state than matrimony. The early fathers, especially St. Jerome, enthusiastically celebrated the virtue of continence. Yet there was no law nor uniformity of opinion or action on the subject, and it was not till the 4th century that even the higher clergy began generally to live in celibacy. The council of the Spanish and African churches at Elvira, in Spain, about A. D. 305, commanded ecclesiastics of the three first grades to abstain from conjugal intercourse under penalty of deposition. A motion to the same effect was made in the general council of Nice, in 325, but it was rejected. Yet a tradition became prevalent about that time, that priests once admitted into holy orders should not afterward marry; and this practice, being once established, led naturally to the opinions that persons who were married should not be admitted into orders, and that celibacy was a holier state than marriage. In the Latin church the usage of celibacy was most strictly observed. Near the close of the 4th century Pope Siricius forbade conjugal intercourse to priests without distinction, and this interdiction was repeated by the subsequent popes and councils. The emperor Justinian declared the child of an ecclesiastic illegitimate, and incapable of being an heir. The

council of Tours in 567 decreed that married monks and nuns incurred excommunication, and that their marriage was null. The Greek church opposed the action of the Latins, and the regular clergy of that church cannot be celibates. A priest, however, can be married only once, and if his wife dies he must go into one of the monastic orders. The monks and the bishops, who are chosen from among them, are unmarried. In the Roman church councils were frequently occupied with rigorous measures against violations of the law of celibacy; and observance of the law was most strictly insisted upon under the pontificate of Gregory VII., who excommunicated every married priest, and every layman who should be present at a service celebrated by him. The reformers rejected celibacy as contrary to natural law, and permitted Protestant ministers to marry. This innovation brought the question up again in the Catholic church, and although the emperor, the king of France, and many of the electors and princes were favorable to the marriage of priests, yet the council of Trent, which closed its sittings in 1563, decided finally to retain the discipline of celibacy. From that time the law has been absolute in the Roman Catholic priesthood. One who has been married cannot be ordained if his wife is living, unless a separation takes place between the parties by mutual consent. Those who have yet attained only the lower orders may renounce their benefices, forsake their orders, and be married; but it is otherwise with subdeacons and the higher degrees. To such the pope alone, notwithstanding the indelibility of the character of priests, may grant permission to retire from the priesthood, and consequently to contract marriage.—See "History of Clerical Celibacy," by H. C. Lea (Philadelphia, 1867).

CELL, a microscopic anatomical form, very abundant in most vegetable and many animal tissues. It has received its name from the fact that in its simplest form it consists of a closed membranous sac or utricle, more or less globular in shape, enclosing a cavity which is filled with a fluid or semi-fluid material. This is the variety of cell which is found in many loose and succulent vegetable tissues. The cell wall usually has upon some part of its inner surface a well defined rounded or oval spot, termed the nucleus; and the nucleus exhibits also a smaller rounded spot of a darker color than the rest, termed the nucleolus. In tissues where the component cells are very abundant and closely set, they are often polyhedral in form, being flattened against each other by mutual compression. Sometimes they are elongated and tubular or prismatic. The elongation of the vegetable cell is sometimes so great, as in certain of the algæ or cryptogamic water plants, that they form, by being connected with each other end to end, long and slender filaments. This also occurs in some of the higher vegetable structures. Other cells send out radiating

processes or prolongations, so as to present a stellated figure. The internal cavity is sometimes partly occupied by a solid deposit upon the inner surface of the cell wall; sometimes it contains a gelatinous liquid, granules of chlorophyll or the green coloring matter, starch grains, and sometimes perfectly formed crystals. There are three great groups of the cryptogamic vegetables, namely, algæ, lichens, and fungi, which consist exclusively of cells; in the higher vegetable forms we find also fibres, air tubes, and vessels. The simpler vegetable cells often multiply very rapidly by a process of budding, or by spontaneous division, or by both combined. They have the power of absorbing nutritious material from the exterior, and converting it into the substance of their own material.—The cells of animal tissues are not precisely similar to those of vegetables. They are usually much smaller, and surrounded by a larger proportion of intercellular substance. They do not, as a rule, present a well marked cell wall enclosing a distinct cavity, but consist rather of a mass of soft animal matter, the consistency of which is nearly or quite the same throughout. Very frequently a nucleus and nucleolus, similar to those seen in vegetable cells, are imbedded in its substance. Thus the red globules of the blood in birds, reptiles, and fish contain a well marked nucleus, though it is absent in those of the mammalia. The nucleus and nucleolus are both very distinct in the cells of the gray nervous matter, and the various kinds of epithelial cells have always a nucleus and usually also a nucleolus. Animal cells also vary in form. The red globule of human blood is flattened and circular; in birds, reptiles, and fishes, it is flattened and oval. The epithelial cell covering the surface of mucous membranes is thin, membranous, and pentagonal or hexagonal in the mouth, fauces, and œsophagus; columnar or prismatic in the rest of the alimentary canal; furnished with vibratile cilia in the air passages, the oviducts, the Eustachian tube, and the ventricles of the brain. There are also hexagonal pigment cells in the choroid coat of the eye, and stellated pigment cells in the web of the frog's foot. The glandular cells of the liver always contain one or more minute oil drops imbedded in their substance. It has been a favorite theory with many microscopists that all the anatomical elements of the animal tissues are directly produced by the development or transformation of simple cells; but this view has never been universally adopted, and the evidence in its favor does not become more convincing with the progress of microscopic discovery.

CELLAMARE, Antonio Gualdie, prince of, duke of Giovenazzo, a Spanish diplomatist of Genoese origin, born in Naples in 1657, died in Seville, May 16, 1733. Brought up at the court of Charles II. of Spain, he afterward fought the battles of his successor, Philip V., against the imperialists. Taken prisoner in 1707, he was detained till 1712. Three years after his re-

turn to Spain he was sent to France as ambassador. Here he joined in the conspiracies planned against the duke of Orleans, with a view of vesting the regency of France in Philip of Spain; but the plot was discovered, and the seizure of Cellamare's despatches laid bare the whole details. He was sent out of France at once, and on his return was appointed captain general of Old Castile, in which post he died.

CELLARER (Lat. *cellarius*), under the Roman emperors, a functionary who examined the accounts, and to whom was committed the care of their domestic affairs. The name was subsequently given to the purveyors or agents for prelates and monasteries. The cellarer was one of the four great officers of monasteries, and had under his orders the bakehouse and the brewhouse. He regulated the harvesting and storing of the corn, and managed the whole economy of the provisions. His compensation was $\frac{1}{13}$ of all the grain received, and a furred gown. The office was sometimes held by persons of illustrious birth. Philip of Savoy, in 1243, was cellarer to the archbishop of Vienna.

CELLARIUS, Christoph, a German scholar, born at Smalcald, Nov. 22, 1638, died in Halle, June 4, 1707. He devoted himself so closely to the study of the oriental languages and literature, that it is related of him that during the 14 years he was professor of history and eloquence at the university of Halle, he only once went out for a walk. He edited more than 20 Greek and Latin classical works, and wrote several volumes on the grammar, geography, history, and languages of oriental countries.

CELLE, or **Zelle**, a town of Prussia, in the province of Hanover, on the river Aller, which is here navigable, and on the Hanover and Harburg railway, 24 m. N. E. of Hanover; pop. in 1871, 16,147. It is a well built and paved town, the seat of the supreme court of Hanover, contains churches of different denominations, an old castle formerly occupied by the dukes of Lüneburg, a Protestant gymnasium, two public libraries, an agricultural society, and various other public institutions. Celle is also noted for its annual horse races. In the castle park is the mausoleum of Caroline Matilda, queen of Denmark, who died here. The inhabitants are employed in the manufacture of tobacco, cigars, and stearine, and carry on transit trade in wool, wax, honey, and wood.

CELLINI, Benvenuto, an Italian artist, born in Florence in 1500, died there, Feb. 25, 1570. He was intended for the musical profession, to which his father was devoted, but gave the preference to the pursuits of a gold worker and engraver, and soon distinguished himself in chasing sword handles, cutting dies, and engraving medals. His headstrong disposition involved him in brawls and quarrels; and at the age of 15, when his genius had already excited the admiration of his townsmen, he was banished to Siena for having taken part in a duel. After wandering for some time from one town to another, he found his way to Rome, where

a gold medal of Clement VII., of which he had furnished the die, secured him the favor of the papal court. The pope took him into his service, and this position gained him employment in cutting seals for many eminent prelates. He also took part in the defence of the castle of San Angelo, against the imperial troops commanded by the constable de Bourbon, and asserted that he killed the constable and the prince of Orange. At Mantua, where he remained until an affray compelled him to leave the town, he became acquainted with Giulio Romano, and through him with the grand duke, who gave him some commissions. On his return to Florence, where his military exploits at Rome had reinstated him in the good graces of the authorities, he formed an intimacy with Michel Angelo. While at Florence he devoted himself principally to the execution of medals, the best of which are Hercules and the Nemean lion, and Atlas supporting the globe. But another quarrel in which he became embroiled compelled him to leave Florence in disguise. He went to Rome, and was there appointed engraver to the mint. He soon found himself again in trouble, and a mistress of his named Angelica having fled to Naples, he followed her thither. He afterward returned to Rome, and remained for a considerable time in the service of the new pope Paul III., although his natural son, Pier Luigi, was hostile to him, and caused him to be imprisoned upon a charge of having robbed the castle of San Angelo during the war. He effected his escape, and through the interference of the cardinal of Ferrara obtained pardon. Subsequently he was employed in France, at the court of Francis I.; but in consequence of differences with the duchess d'Étampes he returned to Florence, where the grand duke Cosmo de' Medici supplied him with a studio. Here he commenced his celebrated "Perseus," which as soon as it was exposed to public view created the utmost enthusiasm. He was employed upon many important works, and was not able to accept a proposition made to him by Catharine de' Medici to superintend the execution of a monument to be dedicated to Henry II. He remained in the grand duke's service until his death, and was buried with great pomp in the church of Sta. Annunziata. He left an autobiography, which is interesting as a record of the incidents of his stirring life, and of the history and manners of his times. It has been translated into German by Goethe, into French by Farjasse and A. Marcel, and into English by Nugent and by Roscoe. The best edition, from which Roscoe's translation was made, is that of Carpani of 1812. Cellini also left MSS. on various branches of art, and the academy della Crusca quotes him frequently as a classic. The best part of his artistic works are his smaller productions in metals, the embossed decorations of shields, cups, salvers, ornamented sword and dagger hilts, clasps, medals, and coins; the most celebrated specimens of his

skill in these branches of art are a richly ornamented salt-cellar in the imperial gallery at Vienna, and a magnificent shield at Windsor castle. Of his larger works, the bronze group of Perseus, with the head of Medusa, in the piazza del Gran Duca at Florence, and his "Christ" in the chapel of the Pitti palace, are the finest.

CELLULAR TISSUE, a name given by the older anatomists to a tissue formed by a mixture of white and yellow fibres, extensively diffused in the animal body under the names of cellular, fibro-cellular, areolar, and fibrous tissue. The best name is areolar tissue, derived from the appearance of *areola*, or meshes, left between the intricate crossings of the component fibres; these were formerly mistaken for cells or cavities; the old term cellular tissue, however, is so well and universally understood, that, though inaccurate, it will probably long be employed in this application. Its principal use seems to be to connect other tissues, allowing at the same time more or less freedom of motion between them; it supports the vessels and nerves in their minutest branches; it is abundant under the skin and the mucous and serous membranes; it enters largely into the formation of membranes, hence often called cellular membranes, protecting the organs and cavities by their toughness and elasticity. The spaces of the cellular tissue are continuous throughout the body, as may be proved by artificial inflation by the blowpipe, and as is frequently seen in cases of emphysema and anasarca, where air or fluid is effused into its meshes. Under the microscope this tissue presents two kinds of fibres, inextricably mingled in various proportions. The one is white and inelastic, disposed to a waved or zigzag arrangement in bands of unequal thickness, creased longitudinally by numerous streaks; the largest of these bands are often $\frac{1}{800}$ of an inch wide; the component fibres do not branch, according to Hassall; this is the white fibrous tissue. The other kind of fibre is elastic, of a yellowish color, composed of branched filaments disposed to curl when not put on the stretch; they are generally about $\frac{1}{8000}$ of an inch thick, interlacing with the others without becoming continuous with them; this is the yellow fibrous tissue. These two elements of the cellular tissue may be at once distinguished by submitting it to the action of dilute acetic acid, which instantly causes the former to swell up and become transparent and soft, while it causes no change in the latter. Cellular tissue is especially abundant in parts which enjoy free motion, as in the face about the eyes and cheeks, the anterior part of the neck, the armpit, the flexures of the joints, the palm of the hand, and the sole of the foot; the superficial and most movable muscles are separated by thicker layers than the deep-seated ones, and the constituent fibres are held together by it during contraction; almost every part of the vascular system is held in place by this tissue,

whose elasticity protects the vessels during the necessary movements of the body; even its own minute but numerous vessels are conducted and enveloped by this all-pervading tissue. It is difficult to say where cellular tissue is not found, unless it be in the teeth, in bone, in cartilage, and in the cerebral substance, where its presence would be manifestly useless. The internal vital organs most exposed to external violence are protected by large quantities of this substance, as the pancreas, kidneys, colon, and genito-urinary apparatus; every organ has its investing covering of cellular tissue, and its processes of the same penetrating and holding together its component parts. It is especially abundant just under the skin, to facilitate its movements, and it exists in uncommon quantity about and in the interior of the mammary glands. Thus this tissue seems to serve as a bond of union between parts, as an element of strength and protection rather than as a substance of primary importance in itself; wherever elasticity is required, the yellow fibrous tissue is most abundant, while the white fibrous tissue prevails in parts demanding resistance and tenacity; and the openness of the meshes is in proportion to the amount of mobility needed. The amount of cellular tissue varies with age and temperament, being greatest in youth and least in old age; the plumpness and roundness of the arms in children and females depend to a great extent on the presence of this substance around the joints, which in man are prominent and angular. Like other soft solids, it contains a small quantity of serous fluid in its interstices, which is favorable for the free movement of the fibres; an unnatural increase of this fluid in the subcutaneous cellular tissue causes the form of dropsy called *oedema*, so common about the feet and ankles, and indicated by the skin pitting under the pressure of the finger. In the English training process it is rapidly lessened, with a remarkable diminution of the bulk of the body; its natural and slow disappearance is seen in old age and in chronic disease, in which the skin, especially about the face and neck, becomes wrinkled and flabby. Its power of reproduction is great, and it is rapidly formed both in healthy and morbid growths; it undergoes the putrefactive process slowly, and when boiled yields gelatine from its white fibrous element.—So extensive a tissue as this must of necessity become involved in many diseases; it is subject to all the effects of inflammation, with suppuration and mortification; to the infiltration of blood, serum, air, and urine; to induration, tumors, and unnatural increase and degeneration. In common inflammation of this tissue, the capillaries become congested, and a part of their contents escapes, more or less tinged with blood; the coagulable lymph thus effused causes the hardness of circumscribed inflammation; this may be removed by absorption, or may become softened by the deposition of purulent matter, constituting an abscess, whose walls are formed

by an indurated layer of the tissue which prevents the pus from spreading indefinitely. When an abscess is formed, the cellular tissue between it and the surface of the skin is removed by ulceration or absorption, or the pus is evacuated by the knife; when from excess of inflammation or other cause the capillary circulation is permanently suspended, the vital properties of the tissue are destroyed, and mortification takes place, the dead parts being removed in offensive fluids and pulpy shreds. In chronic inflammation the cellular tissue becomes indurated. In debilitated conditions of the system, after poisoned wounds, and in certain epidemic alterations of the air, the usual barrier of circumscribing lymph is not effused, and the products of inflammation spread extensively through the areolæ of the subcutaneous and internal cellular tissue; this is familiarly seen in phlegmonous erysipelas, and constitutes a most dangerous disease from the extensive suppuration and sloughing of the tissues. In wounds of the lungs a communication is often established between the air passages and this tissue, when the integuments are variously raised by the infiltration of air in the areolæ, constituting external emphysema; a similar condition is artificially produced by the butcher when he blows up his meat. It grows so rapidly that tumors, often of large size, are developed from it; most so-called "fibrous" tumors are composed of this tissue; in such cases the microscopist is able to detect the fusiform cells and fibres characteristic of the natural tissue.

CELLULOID. See supplement.

CELSIUS. I. Anders, a Swedish astronomer, born Nov. 27, 1701, died in Upsal, April 25, 1744. His grand-uncle, Magnus Celsius (1621-'79), an astronomer, was the discoverer of the Helsing runes. His uncle, Olaf Celsius (1670-1756), a theologian, was one of the founders of the scientific society of Upsal, author of *Hierobotaniceon* (Upsal, 1745-'7), and the first to recognize the genius of Linnæus. His father, Nils Celsius (1658-1724), was a mathematician and naturalist. Anders was professor of astronomy at Upsal 1730-'32, when he visited Doppelmayer in Nuremberg, where he published *Observationes Luminis Borealis*. He next went to Rome, and in 1734 to Paris, where he subsequently joined Maupertuis and his associates in the measurement of the Lapland degree of longitude. On his return to Upsal he published *De Observationibus pro Figura Telluris determinanda in Gallia habitis*. The observatory of Upsal was established in 1740 under his auspices. He was the first to employ the centigrade, also known as the Celsius thermometer. II. Olof de, a Swedish historian, cousin of the preceding, born in 1716, died in 1794. In 1747 he became professor of history at Upsal, was afterward raised to the nobility, and in 1756 founded the first literary journal in Sweden. In 1777 he became bishop of Lund, and in 1786 a member of the Swedish academy. His principal works

are a history of Gustavus I. (2 vols., Stockholm, 1746-'53; 3d ed., 1792; German translation, Copenhagen, 1753), and a history of Eric XIV. (1774; German and French translations, 1777).

CELSUS, an Eclectic philosopher of the 2d century. He was the author of a work against Christianity, entitled *Ἀλλοθής Λογός*. The work itself is not extant, but a large part of it is contained in the answer to it written by Origen a century later. He was skilled in both the Epicurean and Platonic philosophies, and argued *à priori* against the doctrines of the Christian religion. From the statement given by Origen of his arguments, however, his chief reliance would seem to have been on sarcasm and ridicule. He is admitted by some of the Christian fathers to have exhibited great keenness and wit. His work was the first which was written in opposition to Christianity after it became known to the Greeks.

CELSUS, *Aulus Cornelius*, a Roman author, who lived probably during the reigns of Augustus and Tiberius. He wrote a kind of cyclopædia, *De Artibus*, containing a series of treatises on rhetoric, history, philosophy, jurisprudence, war, agriculture, and medicine, of which, besides some fragments, only *De Medicina* is still extant. This work is in eight books. He makes known in it the system of Hippocrates, following besides Asclepiades and the Alexandrians. The first two books treat of diet and the general principles of therapeutics and pathology; the others of particular diseases and their treatment, as well as of surgery. Of its numerous editions, those by Fortius (Florence, 1478), Milligan (Edinburgh, 1826), and Ritter and Olbers (Cologne, 1835), are the best.

CELTIBERIANS (Lat. *Celtiberi*), the people who during the time of the Romans occupied the inland district of Spain lying between the Ebro and the Tagus. The name was sometimes used in a wider sense, including also nearly all the inhabitants of Hispania Citerior. The Celtiberians arose from the mixture of two races, the Celts and the Iberians. Many have supposed that the Iberians were the original inhabitants of Spain, and that the Celts crossed the Pyrenees and invaded their country. Niebuhr was of the contrary opinion, and believed that the Celts once occupied Spain as far south perhaps as the Sierra Morena, and that the Iberians afterward landed from the Mediterranean and drove them northward, expelling them where they were not protected by the nature of the country. The Celts would seem, in Niebuhr's opinion, not to have been expelled from the mountainous country between the Ebro and the Tagus, but merely to have been subdued by the Iberians, who settled among them, and the two nations became amalgamated. The race thus produced retained in a high degree the qualities of the original Iberians. They were with great difficulty subdued by Hannibal, and made a long and obstinate resistance to the Romans. Scipio

induced them to become allies of the Romans; but they revolted in 181 B. C., and renewed the war from time to time during more than a century. After the fall of Sertorius, 72 B. C., they began to adopt the Roman language, dress, and manners, and their country gradually became an integral part of the Roman empire. The great mass of the people inhabiting the central portions of Spain under all these changes retained, and indeed still retain, the essential characteristics of their ancestors. The Celtiberians, like the modern Spaniards, were grave in dress, sober and temperate in their habits, and of an unyielding disposition. Like the modern Spaniards, they were remarkable for the bitter animosity with which they warred against their neighbors, and for the obstinate courage with which they endured protracted sieges. (See IBERIA.)

CELTS (Lat. *Celtæ*; Gr. *Κέλται*), a people of the Aryan or Indo-European family, who in prehistoric times, and probably before the migration of any other Aryan tribes, passed over from Asia into Europe. Subsequent migrations drove them gradually further and further to the westward; and after overspreading many regions in their passage (for evidences of their residence are found in most of the European countries), they appear at the very beginning of the historic period to have so entirely passed away from the eastern portion of the continent, and to have so firmly settled in the regions afterward called Transalpine Gaul and the British isles, that ancient historians believed them to be an autochthonous race, the natives and original possessors of those lands. This theory was strengthened by the fact that the tide of their progress now began to return upon itself; the earliest records showing that even at a remote period they sent out armies and emigrants toward the east, in a direction exactly opposite to the first current of their migration. As early probably as the 5th century B. C. Celts had subdued that part of northern Italy afterward called from their later name Gallia (Cisalpine), and had become firmly settled in the country; they had planted vigorous colonies (Vindelicians, &c.) in southern Germany, near the E. bank of the Rhine; and from these in turn they penetrated, chiefly under the names of Rheti, Boii, Norici, and Carui, into the western regions of modern Austria. Nearly all the territory now included in Switzerland seems also to have been held by them. Celtic tribes, too, had crossed the Pyrenees into Spain, and settled in the country; and from them and the Iberians, the older residents of the peninsula, sprung the mixed race of the Celtiberi, forming a famous nation in the centuries which followed.—The Spanish branch of the Celts was the first to find mention under the name of the race in authentic written records; and Herodotus only noticed this tribe briefly, as living “beyond the Pillars of Hercules, and bordering on the Cynesians, who dwell at

the extreme west of Europe.” (Book ii., 33.) But soon after his time the great body of the Celtic race began to fill a prominent place in general history. About 390 B. C., according to what is little more than a historical tradition, vast hordes of Celts, under their leader Brennus (a word probably equivalent merely to general or king), poured into Italy and sacked Rome, from which they were driven by Camillus. About the same period others appeared along the lower Danube, and succeeded in the establishment of an enduring power there. From this colony many formidable armies went out to carry devastation through Thrace, Macedonia, and Greece. In 280 B. C. one of these, under another Brennus, poured its overwhelming numbers into the kingdom of Ptolemy Ceraunus, defeated and killed that monarch, overran Thessaly, entered central Greece at Thermopylæ, and reached Delphi with the intention of destroying it, when they were at last successfully opposed and driven back. They founded at the same time a kingdom in Thrace, which remained for many years a formidable power, but was finally destroyed by the Thracians around it.—From the same branch of the Celts which sent out these armies (a branch often called the Illyrian Celts from the district, Illyricum, in which their place of settlement was subsequently included) sprung also another offshoot. This consisted of an army which, about the time of the expedition of the second Brennus, crossed the Hellespont into Asia Minor, and appears to have overrun much of the peninsula, until at last the invaders were compelled to confine themselves to the region called after them Galatia. This was successfully held by them, and they established there one of the most enduring of their kingdoms, in which they long preserved many peculiarities of the race.—In the earliest writings the Celts had been called *Κέλται* (*Celtæ*); but as they became better known to the Greeks and Romans, the names *Galli* and *Galatæ* (*Γαλάται*) were more commonly applied to them, these being probably nothing more than corrupted forms of the original word. The names were for a long time used indiscriminately of all the race; but gradually their application was limited—*Galli* (Gauls) signifying those who lived in Europe; *Galatæ* (Galatians), those who settled in Asia Minor; while the name *Celtæ* gradually disappeared. The looseness with which ancient writers use the word *Galli*, employing it now to denote a Teutonic, now a Celtic people, and generally understanding it to mean any northern barbarians, whoever they were, is perhaps the greatest cause of our inability to trace with exactness the gradual decline of the Celts before the advance of other races. Their career after the various wanderings and settlements we have noticed becomes inextricably involved with that of other peoples; and all that can be affirmed with certainty concerning them is the fact that they were gradually absorbed into the Roman,

Germanic, and mixed races that overran Europe during the centuries which followed the beginning of the period of authentic history. In this way they became merely an element in the formation of the nations now populating the European continent, and as a distinct power entirely disappeared from all the region they once had occupied. But although they no longer form an independent nation or people, there remain in the British isles, and in a district of Brittany in France, descendants of the race who retain many of its prominent characteristics, and who continue to make use of different dialects of the ancient Celtic languages. In Wales, Ireland, and the Scottish highlands are found the most marked and distinct types of these; while but a short time has passed since the dying out of a branch of the Celtic race in Cornwall. (See BELGÆ, CELTIBERIAN, CIMBRI, CIMMERII, and GAUL.)

CELTS, Languages and Literature of the. The various families of the race described in the preceding article termed themselves Celts (pronounced Kelts, for in all their languages and dialects the letter C was always hard, and K was absent from their alphabets). Omitting Spain and the north of Italy (the so-called Celtic plain, whose inhabitants became thoroughly Romanized, and of whose ancient literary remains in their own tongue there are no specimens existing), it may be stated generally that two distinct languages were spoken and written by these people, each divided into several dialects. These two languages are still living, spoken and written. They are: 1, the Breton (Breizad), including the Welsh, the Cornish, which has become extinct only within the memory of men, and the Bas Breton, now spoken in the western half of Brittany in France; and 2, the Gaedhlic (Gaelic), which includes the speech of the Scottish highlanders, of the aboriginal Irish, and of the Manx. To avoid confusion, it must be understood that the Welsh call their own language, not Welsh, but Cymraeg (a term perhaps related to the ancient Cimmerian and Cimbric); and it is only in speaking English that they ever accept the name of Welsh at all. Their language is still to be heard commonly spoken throughout the principality, having held its ground better than any of the other Celtic tongues. The other Cymric language, the Bas Breton, is retiring by degrees before the French, and now exists as a living tongue only in that western region of Brittany which the French call *la Bretagne bretonnante*. As for the other family of Celtic languages, it is properly termed the Gaelic; but the Scottish highlanders call it the Erse (pronounced Erish), that is, Irish. The Irish themselves, however, speak of it only as the Gaelic. This is one and the same language, only varying slightly from Caithness to Kerry. The course of ages has introduced some dialectic differences; but even at the present day the speech of the highlanders of Argyle is as

readily understood in Donegal as that of Kerry or Cork. The language of the Isle of Man differs slightly from all these, but in its roots and general structure it is the same. The Celtic languages, then, distribute themselves into the Cymric and the Gaelic. —The BAS BRETON, even within its limited range, has four distinct dialects, those of Tréguier, Léon, Vannes, and Cornouaille; in each of these there are remains existing, in the shape of ballads and romantic or fairy legends. Modern scholars connected with that portion of France, especially the count de la Villemarqué, have done much for the preservation of these singular literary relics of a bygone civilization. There are also dictionaries and grammars: students may consult Le Gonidec, *Dictionnaire breton-français et français-breton*, with a valuable introduction by La Villemarqué (2 vols. 4to, St. Brieuc, 1850); also the dictionary of the dialect of Vannes, by M. Leide, published in 1774. Rostrenen published both a dictionary and a grammar of his native tongue, so far back as 1734. But the most indispensable aid to investigation, not only as to the Breton but as to all other Celtic tongues, is the work of J. O. Zeuss, *Grammatica Celtica, e Monumentis veteribus tam Hibernicæ Linguae quam Britannicæ, necnon e Gallicæ priscæ Reliquiis* (2 vols. 8vo, Leipzig, 1853). For the general character of the literary remains of Brittany, see La Villemarqué, *Barzaz-Breiz* (popular songs printed in the original, with a French translation). All the four dialects of the Bas Breton have been more modified by the Latin than other Celtic tongues, owing to the length of Roman domination. It employs Roman letters, some of which (*a, b, d, e, f, g, h, i, l, m, n, o, p, r, s, t, u, v*) sound as in the ancient Latin, others (*k, w, z*) as in English, two (*j* and the combination *ch*) as in French, and the combination *c'h* like the German *ch* (strongly guttural); *l* and *n* are sometimes what the French call *mouillé*, and *n* is sometimes nasal; *w* is also used as a vowel; the diphthongs are genuine and distinct. Some initials of nouns and of verbs are altered after the finals of the preceding words, viz.: *b* to *v* and *p*, as *bâz* (Lat. *baculus*), *ar vâz*, the stick; *k* to *g*, *c'h*, as *ki* (*canis*), *ar c'hi*, the dog; *cur* (*curia*), *eur ger*, a city; *d* to *t, z*; *gw* to *kw, w*; *m* to *v*, as *mamm* (*mater*), *ar vamm*, the mother; *p* to *b, f*, as *penn*, head, *tri fen*, three heads; *t* to *d, z*; *s* to *z*. The definite article has three forms, *ann* before vowels and before *d, n, t, al* before *l, ar* everywhere else; the indefinite article also varies, *eunn, eul, eur*, in the same positions as the definite. Both are thus used in the singular and plural sense. The genitive is denoted by *eûz*, the dative by *'d*, in both numbers. The plural is made by suffixing *ou* or *iou* (*avêl-ou*, winds; *brêzel-iou*, wars), or *ien, ed, en* (*kaneri-en*, singers; *lôen-ed*, animals; *stêred-en*, stars). Irregular are: *Breizad*, plural *Breiziz*; *askourn*, bone, *askern*, bones; *mâb*, son, plural *mipien*. There are two genders, masculine and feminine. The

comparative degree is formed by *oc'h*, thus, *kaeroc'h*, more beautiful; the superlative by prefixing the article, thus, *ar c'haera*, most beautiful. The numerals are: *unan*, 1; *daou*, 2; *tri*, 3; *pevar*, 4; *pemp*, 5; *c'houec'h*, 6; *seiz*, 7; *eiz*, 8; *náo*, 9; *dék*, 10. The ordinals are made by suffixing *ved* (*trived*, third, &c.); these are irregular: *kenta*, first; *eil*, second. The personal pronouns are *mé*, I; *té*, thou; *hen*, he; *hi*, she. The terminations of the verbs are: *ann* for I, *ez* for thou, the radical for he, she, it, *omp* for we, *it* for you, *ont* for they; thus, *rô-ann*, *rô-ez*, *rô*, *rô-omp*, *rô-it*, *rô-ont*—I give, thou givest, he, she, it gives, we, you, they give. The past tense is formed by *iz*, the future by *inn*, &c. Each verb is preceded by the particle *a* before nouns and pronouns, by *é* (or *éz*, *éc'h*) before adverbs. There are three auxiliary verbs, viz.: *béza*, to be; *kaout*, to have; *ôber*, to do. There are some specific prefixes. The syntax is free, with some anomalies; thus, the third person singular of a verb may be joined to the first and second personal pronouns, as *mé arô*, which is *I gives*, instead of *give*. The structure of Breton poetry is generally in tercets or triads, as in the kindred language of Wales. The principal supernatural agents in the popular poetry of Brittany are the dwarfs and the fairies. The common appellation of these elfish beings is *korrigan*, whether masculine or feminine, from *korrr*, little (diminutive, *korrik*), and *gan* or *gwen*, genius. The goddess Koridgwen is said by the Welsh bards to have had nine attendant virgins, called the nine *Korrigan*. This also was the name of the nine priestesses of the isle of Sein. We may refer here, as characteristic examples, to several of the ancient poems collected and translated by La Villemarqué, especially "The Prophecy of Gwenchlan," "The Submersion of the City of Is," "The Changeling," and "The March of Arthur." "The Plague of Eliant" and the "Tale of Lord Nann and the Fay," as preserved until this time, retain the technical bardic form, which was alliterated and arranged in strophes of three lines. This "Lord Nann," which is said to date from the 5th or 6th century, commences thus:

Lord Nann and his bride, both plighted
In youthful days, soon blighted,
Were early disunited.

Of snow-white twins a pair
Yestreen the lady bare,
A son and daughter fair.

"What cheer shall I get for thee,
Who givest a son to me?
Say, sweet, what shall it be?"

"From the forest green a roe,
Or a woodcock from where I trow,
The pond in the vale lies low?"

"For venison am I fain,
But would not give thee pain
For me the wood to gain."

But while the lady spoke,
Lord Nann took his lance of oak,
And mounting his jet-black steed
Rode forth to the wood with speed.

When he gained the greenwood shade,
A white hind from the glade
Fled, of his lance afraid.

Swift after the hind he flew;
The ground shook 'neath the two,
So swiftly on they flew,
And late the evening grew.

It ends in this gallant huntsman coming "under the ban of a *Korrigan*," and the death of himself and his wife, from whose grave sprang forth "two spreading oaks." As a specimen of the Bas Breton tongue itself, we give the following from the tale of *Koadalan* (dialect of Tréguier): "*Neuzé a krogas ann aotro en-han hag a savas gant-han en er, uhel, uhel. Diskenn a eure gant-han e-kichen ur c'hastell-kaer, en un âle vraz, lec'h ma oe souezet o welet skrivet war delio ar gwez: Ann hini a antré aman, na sorti kén. Ma teuas c'hoant d'ehan mont-kuit, met penoz? Antren a reont ho daou bars ar c'hastell; debri hag eva a reont, ha goudé koan, a kousk mad en ur gwélé-plun.*" Which is thus translated: "The knight then took him up, and lifted him very high into the air. He descended near to a fine castle, in a grand avenue, where Koadalan was much surprised to see written on the leaves of the trees, 'He who enters here never goes away again.' Which gave him a desire to go at once; but how? They enter together into the castle; they eat together; and after supper Koadalan sleeps well in a bed of feathers." On the whole it may be said that the relics of Bas Breton literature are entirely confined to childish fairy tales and stories of romance, offering little or nothing of the antiquarian historic interest which is found in the remains of the Cymric tongues of Wales and in the Gaelic of Ireland.—THE WELSH (*Cymraeg*). The alphabet of this language consists of thirteen simple and seven double consonants and seven vowels, with numerous diphthongs and triphthongs. The letter *c* always has the sound of *k*; *ch* is sounded gutturally, as in the Scottish word *loch*; *dd* is equivalent to *th* in English; *f* has the sound of the English *v*, *ff* of the English *f*, *ll* a peculiar sound similar to that of the French *l mouillé*, *u* and *y* that of the Italian *i* or English *ee*, and *o* of *oo* in fool. The accent is always on the ultimate or penultimate syllable. Initial consonants are changed by declension and by the effect of preceding words; *e. g.*: *tád*, a father; *ei dád*, his father; *ei thád*, her father; *vy nhád*, my father. Thus *p* is changed into *b*, *mh*, and *ph*; *t* into *d*, *nh*, and *th*; *b* into *f* and *m*; *d* into *dd* and *n*, &c. There is one article, which is not declined, but varies according to the initial letter of the following word. Substantives are declined by prepositions, by terminations, and by changes in their radical vowels; *e. g.*: *perth*, bush, plural *perthi*; *bua*, bow, plur. *bwaau*; *tyrfá*, throng, troop, plur. *tyrfaoedd*; *march*, horse, plur. *meirch*; *ffordd*, road, plur. *ffyrdd*; *alarch*, swan, plur. *elyrch*; *mab*, son, plur. *meibion*; *nant*, brook, plur. *nentydd*; *maen*, stone, plur. *meini*. There are but two genders,

masculine and feminine. Adjectives are formed from substantives, and verbs by means of the terminations *aïd*, *gar*, *ig*, *in*, *lyd*, *og*, and *us*. The comparative is formed by the ending *ach*, the superlative by *af*; e. g.: *du*, black; *duach*, blacker; *duaf*, blackest. The feminine adjective is formed from the masculine by softening the initial letter, and also by changing the radical vowel. The verb has no present tense, to express which the future is used, or the substantive verb *wy* (I am) with the infinitive. There are, however, imperfect, perfect, pluperfect, and future tenses, which are formed, both in the optative and indicative moods, by endings and changes of vowels without auxiliary verbs; e. g.: *caron*, I loved; *cerais*, I have loved; *carason*, I had loved; *caraf*, I shall love. Each tense has three persons both in the singular and plural; e. g.: *caron*, *carit*, *carai*, *carem*, *carech*, *carant*. The passive voice is wanting, and is expressed by a peculiar circumlocution. There are several irregular verbs besides *wy*. The adjective is usually placed after the substantive, but is often placed before. The numerals are: *un*, *dau* or *dyw*, *tri* or *tair*, *pedwar* or *pedair*, *pump*, *chwech*, *saith*, *wyth*, *naw*, *deg*. The personal pronouns are: *mi*, I; *ti*, thou; *en*, he; *hi*, she; *ni*, we; *chwi*, you; *hwy* or *hwynt*, they. "The language," says Ferdinand Walther, "has great power, simplicity, and precision. It is very rich especially in roots, and has a remarkable capacity to express an entire abstraction in a single word."—The literature of the Cymri has laid claim to a very ancient origin, but modern criticism shows that even the earliest Welsh writings are subsequent to the Christian era. The first eminent bard of whose period of existence we have a distinct record was Myrddin, the bard of Prince Emrys, the first Merlin of romance, who flourished about 450. Aneurin, identified by some with the Gildas of ecclesiastical history, Taliesin, prince of bards, Llewarch Hen, and Myrddin Wyllt or Merlin the Wild, belong to the 5th and 6th centuries; of them all numerous poems remain. The most gifted among more modern bards was perhaps Dafydd ap Gwylim (1295–1356), sometimes called the Ovid of Wales, the poet of love and nature. A volume of translations from his writings has been published in London (1834). Huw Morris (1622–1709) wrote songs, carols, and elegies, and sometimes violent political satires. The last remarkable poet of Wales, Goronwy Owen (1722–1780), died poor in New Brunswick, and his productions, including the *Cwydd y Farn* ("Day of Judgment"), regarded as the finest work of genius in the language, were first printed in 1819. The earliest Welsh prose literature is the triads, said to be of druidic origin, a sort of maxims in triplets, each setting forth a historical event or a moral principle. Next is the "Chronicle of the Kings of the Isle of Britain," supposed to have been written by Tysilio in the 7th century, and said to be the

original of the chronicle of Geoffrey of Monmouth. It was continued to the year 1152 by Caradwg of Lllancarvan, whose work is also in existence. The "Code of Howel Da," of the 12th century, is also an important literary monument, as is the "Biography of Gruffydd ap Cynan," of the 15th century. The *Mabinogion* ("Juvenile Diversions"), made accessible to English readers by the translations of Owen Pugh and Lady Charlotte Guest, is a collection of Cymric legends and fairy stories of unknown antiquity, but committed to writing in the 14th century. "The Sleeping Bard," written about 1700 by Elis Wyn, a moral and religious allegory, divided into the "Vision of the World," "Vision of Death," and "Vision of Hell," is a work of great originality and power; it has been translated into English by George Borrow (London, 1860). The first translation of the New Testament into Welsh was made by William Salesbury (1597), and the first translation of the whole Bible was completed by William Morgan and published in 1588. Considerable bodies of Welsh emigrants have brought their native language to the United States, and there are communities in which it is the prevailing tongue. Welsh periodicals, newspapers, and religious tracts and books are also published in the United States for the use of citizens of Welsh origin. A convenient Welsh grammar for students is that of William Spurrell (London, 1848; 2d ed., 1853).—Of the Cornish branch of the Cymraeg, now extinct as a spoken language, the indefatigable Zeuss, in the *Vocabularium Cornicum* of his *Grammatica Celtica*, has given almost all that is now known. There is also the "Ancient Cornish Drama," edited and translated by Edwin Norris.—THE GAELIC. For this language, spoken in Scotland and Ireland, there are many grammars and dictionaries. Among these may be mentioned the dictionary of Edward O'Reilly (4to, Dublin, 1817), a book which has lately acquired much additional value by a new edition and supplement prepared by the eminent Gaelic scholar John O'Donovan, editor of the "Four Masters." This work may be taken for the present as the nearest approach to a standard dictionary of the language. Of grammars there are also several; of which we name that of Neilson, that of Owen Connellan (Dublin, 1844), and the "College Irish Grammar," by the Rev. Ulick J. Burke, of St. Patrick's college, Maynooth (Dublin, 1856). The literary and historic remains of this language are very voluminous, and have been industriously collected, translated, and annotated by modern scholars, both in Scotland and in Ireland. They consist mainly of annals, laws, and genealogies, but with a large infusion of romantic and fairy tales like those of Brittany. The Gaelic speech has varied considerably from age to age; and a great portion of the industry of its professors has been expended upon the "glosses," that is, partial translations of sentences and phrases, from the Latin, or into the

Latin, made by monks in all the monasteries of Europe for many ages. The spoken language of Connaught or of Inverness gives but little help in these researches; for the speakers of this language could not understand an ancient manuscript of the 12th century if read to them. The alphabet of the language consists of 18 letters, named from trees (*ailm*, elm; *beithe*, birch; *coll*, hazel, &c.). The letters *k*, *q*, *v*, *x*, *y*, and *z* are wanting. Many consonants are not pronounced. The pronunciation varies in different periods and localities. The indefinite article, the neuter gender, and a special form for the present tense of the verbs are wanting in Gaelic. There are two declensions and two conjugations. A peculiar metaphony is much used, as: *fear*, a man; *fir*, of a man; *fhir*, O man! The system of prefixes and suffixes resembles that of the Semitic tongues. The numerals are: *aon*, a *h-aon*, 1; *dhà*, a *dhà*, 2; *tri*, 3; *ceithir*, 4; *cuig*, *coig*, 5; *sè*, *sia*, 6; *seachd*, 7; *ochd*, 8; *naoi*, *naoth*, 9; *deich*, 10; *aon deug*, 11, &c.; *fichead*, 20; *deich ar fhichead*, 30 (10+20); *da fhichead* 40 (2×20), &c.; *ceud*, *ciad*, 1,000, &c. The nominative plural is formed by adding *ean*, as *clàr sairean*, harpers. The sexes are distinguished by three methods: by different words, by prefixing *ban* or *bain* for feminines, and by an adjective. The personal pronouns are: *mì*, *mhi*, I; *tu*, *thu*, thou; *e*, *se*, he; *i*, *si*, she; *sinn*, we; *sibh*, you; *iad*, *siad*, they. The relative pronouns are: *a*, who, which; *an*, whose, and to whom; *na*, that which; *nach*, who not. The possessives are: *mo*, my; *do*, thy; *a*, his, her; *ar*, our; *bhur*, *ur*, your; *anjam*, their. The interrogatives are: *co*, who; *cia*, which; *ciod*, what. The indefinite pronouns are: *càch*, the rest; *cuid*, some; *eile*, other. Among the verbs are: *phaig mi*, I wrapped; *phaig thu*, *phaig e*, &c.; negatively, *do phaig mi*, &c. *Abair*, to say; *thubhairt mi*, I have said; *air radh*, said; *ag radh*, saying. Verb to be: *tu mi*, I am; *ta thu*, thou art; *ta e*, he is; *ta sinn*, we are, &c.; *am bheil mi*, am I; *cha'n eil mi*, I am not. Among the prepositions are: *a*, *as*, of; *ag*, at; *air*, on; *an*, in; *bhàrr*, off; *car*, during; *do*, to, of; *eadar*, between; *gu*, till; *mar*, as, like; *o*, from; *ré*, during; *re*, *ri*, *ris*, to; *trid*, through, &c.—The best authorities to be consulted as to the actual literary remains which now exist in the Gaelic are the *Grammatica Celtica* of Zeuss, before cited, and the works of the late Eugene O'Curry and John O'Donovan, both members of the royal Irish academy. O'Curry has left a specially valuable book of reference for Gaelic students, "Lectures on the MS. Materials of Ancient Irish History" (Dublin, 1861). This elaborate work contains almost all that is now accessible concerning the writings still existing in the Gaelic tongue, with catalogues and descriptions of the "lost books," which appear to have been very numerous. But still many works have not been lost; and the zeal of antiquarian societies, the archaeological, the Celtic society, and others, has presented to the public a

whole library of Gaelic lore, generally with translations and careful notes by John O'Donovan. The most voluminous of these is the "Annals of the Four Masters," in 7 vols. 4to, a book which was compiled in its present form so late as the beginning of the 17th century, but which was necessarily founded upon chronicles of very remote times. This book, with its notes, together with the publications of the Celtic and Ossianic societies and the series of volumes put forth by the archaeological society, may be said to furnish all the information which is extant on the subject. The chevalier Nigra, late Italian minister at Paris, is one of the most zealous Celtic students. His *Glossæ Hibernicæ Veteres Codicis Taurinensis* (Paris, 1869), from Gaelic MSS. and glosses found in the monastic libraries of Milan and Turin, has been highly praised by Celtic scholars. It ought to be mentioned that the work of Zeuss was revised and almost reconstructed after his death by H. Ebel; and it is now the most authoritative book of reference for students either of Gaelic or Cymric.

CEMENTATION, a chemical process chiefly employed in the manufacture of steel and of porcelain glass. To convert wrought iron into steel, the bars are selected with care, broken into convenient lengths, and placed in layers in pots, mixed with and surrounded by charcoal. These pots are subjected to an intense heat, by which the carbon gradually penetrates the iron, and combines with it. Different views are entertained with regard to the formation of cement steel, but it is most probable that the carbonization of the iron bars, when heated in powdered coal with the exclusion of air, takes place by means of cyanogen compounds which are formed in the state of gas, rather than by a direct reaction of carbon or carbonic oxide gas. The American bank note company cement their engraved plates in carbon obtained from fine ivory turnings. Bottle glass is cemented with gypsum powder or sand, to form Réaumur's porcelain.

CEMENTS, certain substances which by their interposition cause the surfaces of solid bodies to adhere together or to unite, the action being either mechanical or chemical, or both. The history of the fabrication of cements, like that of many other arts, reaches so far back into the early ages that it is impossible to ascertain with much exactness where it was first skilfully practised. The ancient Egyptians 4,000 years ago possessed the knowledge not only of making building mortar, but of mixing earthy materials which would set and harden under water. In the construction of the pyramid of Cheops, a cement made of Nile mud and gypsum is believed to have been used. Many of their sculptures in bass relief were executed in cement, and examples are still preserved of Egyptian ceilings in painted stucco of a date much earlier than Solomon's temple. The pictures in relief which have been discovered in the excavations at Nineveh were mostly executed in alabaster;

but the Babylonians, not having such materials, covered their bricks with plaster, on which they made their designs. It was upon the "plaster of the wall" of Belshazzar's palace that the mystic hand traced the fatal letters. Under Nebuchadnezzar Babylon became the first city in the world, and mortars and cements of various kinds, of a bituminous and earthy character, were used in enormous quantities in the construction of edifices and public works. The Greeks gave the subject much intelligent attention, as is evidenced by the chemical composition and state of preservation of mortars and cements which have been found in their ancient temples; and it is a matter of history that in the earlier development of the architectural and engineering arts by the Romans, the Greeks were often consulted by them. The Romans, however, attained to the greatest distinction for the magnitude and durability of their works. They prepared an excellent cement for hydraulic purposes, which they used in making concrete with broken stones for the construction of various piers and harbors on the Mediterranean. They early became acquainted with the properties of pozzuolana, which mixed with burned lime gave them a hydraulic cement that can scarcely be said to have been since excelled. The mole or breakwater of Pozzuoli is one of the monuments of the durability of their hydraulic structures. It was composed of 24 arches, sustained upon piers, built of brick faced with stone, and held together with cement made of pozzuolana and lime. Thirteen of the piers are still above the water, although they were built more than 1,800 years ago. The arched construction was for the purpose of preventing a collection of sand behind the mole. Vitruvius, in his work *De Architectura*, says: "There is found in the neighborhood of Baïæ, and the municipal lands lying at the foot of Vesuvius, a kind of powder which produces admirable effects; when mixed with lime and small stones it has not only the advantage of giving great solidity to common buildings, but possesses the further property of forming masses of masonry which harden under water."—Cements may be divided into those which are chemical and those which are mechanical, or into the stony and the resinous and glutinous. The stony cements may be again subdivided into those which harden on exposure to the air, such as common building mortar; those which harden when immersed in water, as the hydraulic cements; and those which harden principally by combining with water, as gypsum and gypseous cements. Common building mortar is made of lime and sand. The preparation of lime by calcination from limestone, chalk, marble, and other forms of carbonate of lime, is treated of in the article **LIME**. Many kinds of limestones contain carbonate of magnesia as well as carbonate of lime, and are called dolomitic limestones. When the proportion of carbonate of magnesia is 46 per cent., the stone is called dolomite,

and has been pronounced unfit for making building mortar. It does not become so hot in slaking nor set so soon as pure lime; but those who use it assert that in time it becomes harder. Some of the best lime in this country is made from stone obtained along the Hudson river, much of which is almost pure dolomite. Before mixing with sand, the lime is slaked, a process that requires to be carefully performed in order to secure good results. Three volumes of quicklime moistened with one of water slakes with much violence and the evolution of heat, which often reaches 300° F. If enough water is used to cover the lime, it will be made to boil. Slaked lime is a hydrate of the protoxide of calcium, and is two and a half or three times the volume of the quicklime used. All the water used in slaking should be added at once. Less than is required to convert all the lime to a hydrate will cause a granular powder to be formed, which is of inferior value. After the slaking is completed the mass should be allowed to lie one or two days before it is made into mortar. In the south of Europe it is often put in boxes and kept for months, a practice which is thought to increase its power of conferring hydraulic energy to pozzuolanas. When used, the slaked lime should be made into a creamy paste by the addition of about an equal quantity of water. The quantity of sand to be added depends upon the use which is to be made of the mortar, and also upon the quality of the sand. In order to prevent shrinking, there should not be much more lime paste than is sufficient to fill the void spaces between the particles of sand. Coarse sharp sand will therefore take more lime than that which is fine, and will in time generally become harder. For bricklaying and the rough or foundation coat of wall plastering, the proportions vary from two to three parts of sand to one of lime paste. In the rough coat in wall plastering about one sixth part by measure of cows' hair is mixed, to aid in binding. Mortar may be mixed by hand, in which case a common hoe is the implement generally used. A mill, however, mixes the materials more thoroughly, and when a large quantity is required will repay the outlay. A common pug mill, such as is used for grinding clay for brick, answers the purpose very well, or one having a pair of heavy rollers moving round an axis in a circular pan. A form used in Europe is a conical mill, which empties into a trough or tube in which a spiral band wound round a shaft revolves, while it mixes the mortar and carries it to the end, when it is delivered into tubs. The setting and hardening of mortar are two distinct processes. Setting is caused partly from the adhesion that takes place between the particles of sand and lime, and which is no doubt increased by incipient chemical action, partly from the formation of more or less crystalline hydrate, and probably to some extent by evaporation. The hardening of common building mortar consists in the

slow conversion of the hydrate of lime into carbonate and silicate, and the deposition of crystalline hydrate, and also in the cohesion that naturally results from the long-continued apposition of particles of matter with one another. There has been a long and an unsettled controversy among chemists, architects, and engineers in regard to the changes which take place in mortar after it has been laid in walls exposed to the air, some maintaining that the hardening is chiefly caused by the conversion of the hydrate of lime into carbonate; others believing that it is principally due to the slow formation of a silicate; and others again that it is due to both these changes, and also to the crystallization of hydrate and consequent packing of void spaces aided by the force of cohesive attraction. From the investigations of Prof. F. Kuhlmann of Lille, in regard to the action of alkaline silicates upon limestones and chalk, it is probable that the lime after becoming carbonated is susceptible of combining with a certain portion of silica, if this is present in a soluble condition in combination with an alkali, and forming a silico-carbonate of lime. Petzholdt examined several old mortars. Some that were 300 years old yielded lime water when digested in fresh water, thus showing the presence of caustic lime. Some portions effervesced in cold dilute hydrochloric acid, yielding in a short time a stiff jelly, thus revealing the presence of a soluble silicate of lime. He moreover found that in similar mortars, those which were 300 years old contained three times as much soluble silicate of lime as those which were only 100 years old. These experiments not only show that silicification takes place in building mortar made of lime and sand, but that it takes place in a pretty constant rate of progress, which would appear to be somewhat independent of the degree of carbonization attained by the lime.—Hydraulic cements are used in the construction of fortifications, breakwaters, aqueducts and reservoirs, canals, foundations of bridges, and other works of military and civil engineering, as well as in the construction of cellars and cisterns. The useful property which they possess of rapidly setting when immersed in water, and of continuously hardening under the same influence, chiefly results from the strong affinity of caustic lime for silica and alumina, and from the affinity the resulting compounds have for water, and their insolubility. They are divided into two principal classes, natural and artificial cements. The former are entirely made from certain rocky strata or earthy substances, without any admixture of foreign material; while those which are artificial are made by combining earthy substances with caustic lime, and sometimes small portions of an alkali. Certain geological formations contain beds which are composed of such proportions of lime, alumina, silica, the alkalies, and a few other bodies of less consequence, that after they are calcined insoluble compounds are formed on the addition of water.

Other formations exist, of a less calcareous constitution, which need the addition of caustic lime to enable them to perform the same or similar reactions; and there are others which contain too much lime to be capable of being used for hydraulic cement, but which may be employed in making what is termed hydraulic lime. The stone from which hydraulic cement is made in the United States is found in stratified rocky beds of aqueous deposits, lying principally in strata of the Silurian system connected with the Appalachian chain of mountains. It is an argillaceous limestone, which yields on calcination the proper proportions of lime, alumina, and silica to unite with water and form a hard substance without slaking or expanding, and also to indurate continuously in consequence of other chemical reactions. The Silurian system, in the classification of the New York geologists, lies in strata in the following order:

SILURIAN SYSTEM.	Upper.	Lower Helderberg.	Lower Helderberg.
		Salina.	Saliferous.
		Niagara.	Niagara. Clinton. Medina. Onondaga.
	Lower.	Hudson.	Hudson river. Utica.
		Trenton.	Trenton. Black river. Birdseye. Chazy.
		Potsdam.	Calcareous sandstone. Potsdam sandstone.

This formation covers a large space in Canada, N. of New York, about the size of that state, and also a large area N. W. of Lake Ontario. In the United States it covers about half of the state of New York and the western part of Vermont, whence it extends in a belt S. W. through eastern New York, and through the states of New Jersey, Pennsylvania, Maryland, Virginia, and East Tennessee. It also appears in Middle Tennessee and Kentucky, and covers a vast area W. and N. W. of Lake Michigan, 600 m. in longitude and from 200 to 500 in latitude. Most of the hydraulic cement in New York is obtained from beds in the Trenton and lower Helderberg formations. In Ohio beds are found in the upper coal measures, and in Illinois in the lower carboniferous formation and in the Niagara group. In Canada there are beds in the saliferous group. Only a few layers of these groups are used, most of them either containing too little or too much lime. Those of the Trenton group which furnish hydraulic cement extend from Vermont, in a narrow belt, southward through the eastern tier of counties in New York, passing into Orange county at Newburgh; thence through Sussex and Warren counties, New Jersey, into the state of

Pennsylvania, appearing in Berks, Chester, Lancaster, and York counties, and passing through Maryland into Virginia, where they are found in Rockingham, Augusta, Rockbridge, Roanoke, and other counties. The tencalcite, or water limestone of the lower Helderberg formation, however, furnishes most of the hydraulic cement that is used in the United States. Large deposits are found in Oneida, Onondaga, Madison, Niagara, Erie, Ulster, and Sullivan counties, New York. The largest development of the manufacture has taken place in Ulster county. The deposits there occupy a narrow belt in the valley of the Rondout creek, along the line of the Delaware and Hudson canal, and pass into New Jersey and Pennsylvania, but have not been found east of the Hudson river. The following table, made from a larger one in the work of Gen. Q. A. Gillmore "On Limes, Hydraulic Cements, and Mortars," gives analyses made by Prof. E. C. Boynton of four samples of hydraulic limestone, and the localities from which they were taken:

CONSTITUENTS.	Shepherdstown, Va.	Alton, Erie co. N. Y.	High Falls, Ulster co., N. Y.	
			Layer 11.	Layer 12.
Carbonate of lime.....	58.25	35.60	30.74	30.72
Carbonate of magnesia.....	11.16	19.26	14.48	35.10
Silica, clay, and insoluble silica.....	17.84	38.80	39.74	19.64
Alumina.....	4.60	8.96	6.00	7.52
Sulphuric acid.....	.74	.50	.66	.64
Chloride of sodium & potassium.....	3.26	6.18	7.42	4.10
Peroxide of iron.....	1.70	.88	1.44	2.38
Hygrometric water lost at 212° F.	.20	.14	.24	.18
Total.....	97.75	100.32	100.72	100.28

The limestone from which cement is made, as has been intimated, varies considerably in quality even in the same locality, the difference depending much upon the relative position of the layer from which it is taken. The nearer it lies to those strata that are decidedly calcareous, the more it approaches in character what is called a rich lime, slaking and expanding more or less. Again, when the more highly argillaceous strata are approached, and the deposit contains less lime, it loses energy and capability of hardening. Some of the stones require greater time for calcination than others, from 20 to 40 hours being the range. If the temperature is raised too high, the silicate is partially fused and the property of setting under water destroyed. It is therefore evident that such stones should not be burned together, although they may be mixed afterward. Careful inspection is not always sufficient to detect the difference, nor is chemical analysis always to be relied on, although it is quite probable that those limes which contain much alkaline silicates should not be so highly calcined as others. Trial kilns capable of burning from 100 to 300 lbs. should be frequently used. In preparing hydraulic cement

for the market, similar kilns to those used for calcining common limestone are employed, and the processes are also similar. The perpetual flame kiln, or the draw kiln, such as is used on the continent of Europe, particularly the one invented by Friedrich Hoffmann of Berlin, is preferable. Kilns which are charged with alternate layers of fuel and limestone do not furnish so equable or controllable a degree of heat, and it is more important to secure this condition in calcining hydraulic limestone than in making quicklime. The process of calcination is described in the article LIME. After burning, the stone is passed through a crushing mill and reduced to small pieces of the size of beech nuts, and is then finely pulverized by ordinary millstones. The crushers in general use are capable of preparing for the mill about 250 bbls. per day each; and one millstone will grind about 10 bbls. per hour. One cubic yard of stone from the quarry yields about 9 bbls. of ground cement, of 300 lbs. each. In Ulster county it is packed in barrels as it comes from the spout. The color of most of the hydraulic cement made in this country is a lighter or darker drab, the depth of hue depending principally upon the amount of oxide of iron which may be present. It will be observed from the table that the hydraulic limestones of Ulster and Erie counties, N. Y., as well as the one at Shepherdstown, Va., contain a large proportion of carbonate of magnesia. This might be regarded as a defect from what has been said of the effect of the presence of magnesia in common lime; but the case is altered in respect to hydraulic cements, and they are considered by Vicat and Marshal Vaillant, as well as by MM. Rivot and Chatoney, as being superior for hydraulic purposes on this account. When hydraulic cement is to be used, it is made into a paste with water, but no definite rules as to the proportion can be prescribed; the best plan being to add just that quantity which will form a paste of such a consistence as can be manipulated with facility by the trowel. When the cement is used to form grout for filling in walls, it requires to be made thinner. The setting and hardening of hydraulic cement are processes not so distinctly separated as they are in the case of common building mortar. The setting and much of the hardening take place simultaneously, or rather the setting and hardening are mostly one and the same process; and with some cements it takes place almost immediately, further hardening proceeding slowly by cohesion, and by further chemical changes that have been commenced. The time varies with the kind and quality of the cement, some kinds taking not more than ten minutes, while others require more than as many hours, to become hard enough to fracture. MM. Rivot and Chatonay state that in calcination of an argillaceous limestone, when it has been just sufficient to expel the carbonic acid from the carbonate of lime, there will be formed a silicate and an aluminate of

lime, SiO_3 , 3CaO , and Al_2O_3 , 3CaO , which on the addition of water become hydrates, SiO_3 , 3CaO , 6HO , and Al_2O_3 , 3CaO , 6HO . But if the calcination has been effected with intense heat, so as to produce partial vitrification, the reaction will become more complex, silicate of alumina and silicate of lime being formed first; after which, on the addition of water, decomposition takes place with the formation of hydrosilicate and hydroaluminate of lime, each containing three equivalents of water instead of six. From the fact that increased hydraulicity is conferred on some earths which are used in making hydraulic cement by mixing them with lime that has been slaked a long time and exposed to the air, and therefore partially reconverted to a carbonate, it would appear that double decomposition is often favorable to the silicification of the lime; or in other words, that on quitting its union with carbonic acid it more readily combines, in consequence of being in a nascent state, with the silica, which on leaving its union with an alkali is also in a nascent condition. What influence oxide of iron may have on the hardening of cements is still a matter of discussion. Experience sometimes seems to favor the idea that it is beneficial in ultimate hardening; but very hard cements have been made which contained scarcely a trace of iron, and the subject must be considered as involved in doubt.—The hydraulic cements principally employed in Europe are the Roman, Portland, Medina, Mulgrave, and those made on the continent from pozzuolana, trass, santorin, and Teil lime. Modern Roman cement, so called because of its similarity to the old Roman cement, is principally made in England and France. The English article is made from nodules, or septaria, found in the Kimmeridge and London clays. The first modern Roman cement was made by Mr. Parker of London, who patented his process in 1796; it consisted in calcining the septaria stones nearly to the point of vitrification, and then crushing and grinding them to powder without admixture of any other material, the product being therefore a natural cement. Roman cement is also made at Boulogne from nodules of septaria lying in the same geological formation, and does not essentially differ in quality from that made in England. Roman cement is now made in England from a clay shale found above the chalk formation in the isle of Sheppey and the isle of Wight. In Germany Roman cement is also made from limestones of a similar character. All the Roman cements contain a notable quantity of oxide of iron, as will be seen in the following table of analyses by Michaelis :

CONSTITUENTS.	1.	2.	3.	4.
Lime.....	53.88	55.50	47.83	58.88
Magnesia.....	5.00	1.73	24.26	2.25
Silicic acid.....	28.83	25.00	5.50	23.66
Alumina.....	6.40	6.96	1.50	7.24
Oxide of iron.....	4.80	9.63	20.80	7.97

No. 1 is Roman cement from the Rüdersdorf limestone; 2, from limestone shale from the isle of Sheppey; 3, from limestone forming the under bed of the lead ores at Tarnowitz; and No. 4 is from Hausbergen limestone. Portland cement, an artificial compound, so named from its resemblance to Portland stone, was first manufactured by Joseph Aspdin of Leeds, England. His method was, according to his letters patent, to pulverize limestone and burn it in a kiln; then to add an equal weight of clay and thoroughly knead the mixture with water to a plastic mass, which was dried, broken in pieces, and again burnt to expel all the carbonic acid. Since that time, however, great improvements have been made in its manufacture, both in England and on the continent. To obtain the best results, it has been found that the lime should be in a state of carbonate when it is mixed with the clay, and therefore, on account of greater facility and cheapness, chalk is employed instead of limestone. Two methods are practised, one in England and the other in Germany, which are somewhat different. In England the wet method is followed, which consists in mixing the materials together with water and grinding them to a pulp, which, after evaporation to the proper degree of stiffness, is made into balls or bricks, which are dried and then calcined to near the point of vitrification, after which they are ground in a mill. The proportions of the ingredients are from 65 to 75 per cent. of chalk to 25 or 35 per cent. of clay. In Germany the dry method is preferred, which consists in first drying the materials and reducing them to powder separately, after which they are mixed with water in the proper proportions, and made into bricks, which are then dried, calcined, and ground, as in the English method. The Germans also add a certain quantity of alkali, either soda or potash, depending upon the quantity which may already be contained in the clay, but enough to bring the amount to 3 or 4 per cent. of the whole, for the purpose of forming a soluble silicate to act upon the lime in setting; and sometimes a small amount of finely pulverized sand or quartz rock is added. In making mortar of Portland cement Mr. Lipowitz, a German manufacturer, recommends the use of about 100 parts of cement to 44 parts of water, but the proportions are subject to variation. Analyses of four varieties of Portland cement made in England and Germany are given by Michaelis :

CONSTITUENTS.	1.	2.	3.	4.
Lime	59.06	62.81	60.83	55.06
Silicic acid.....	24.07	23.22	25.98	22.92
Alumina.....	6.92	5.27	7.04	8.00
Oxide of iron.....	3.41	2.00	2.46	5.46
Magnesia	0.82	1.14	0.23	0.77
Potash.....	0.73	{ 1.27 }	0.04	1.13
Soda.....	0.87		0.30	1.70
Sulphate of lime.....	2.85	1.80	1.52	1.75
Clay sand.....	1.47	2.54	1.04	2.27
Total.....	100.20	99.55	99.84	99.06

Nos. 1 and 4 are English Portland cements, No. 2 made at Stettin, and No. 3 at Wildau. It will be remarked that in these instances the English cements contain the largest proportions of alkalies. In France a similar method is employed. The hydraulic lime of Saint-Leger is made of four parts of chalk to one of clay. The ingredients are ground together in a mill with water, and when sufficiently firm the mixture is made into bricks, which are calcined in a common kiln, mixed with coke, a lower degree of heat being employed than in burning Portland cement. Gen. Pasley is regarded as the founder of artificial cement manufacture in England. In 1826 he made a cement by burning the river mud from the Medway with limestone or chalk. This mud, on account of its argillaceous composition, as well as from the presence of sodium salts, is well adapted to the purpose; but other materials are now used, such as marls mixed with clay, and generally the deposits at the deltas of rivers. A natural Portland cement is made at Boulogne, from a layer of Kimmeridge clay which lies about 160 ft. below the strata in which the septaria nodules are found. It is burned and ground without the addition of lime or any other material. In burning this earth the best results are obtained by bringing it to a white heat, so that vitrification begins to take place. It has a greater specific gravity than English Portland cement, and requires less water for making into paste than either that article or the Boulogne Roman cement; and it also sets more slowly, requiring from 10 to 20 hours. The reason of its taking less water is explained by the theory of MM. Rivot and Chatoney that where cements are calcined at a high heat silicate of alumina and silicate of lime are formed, which on the addition of water undergo decomposition with the formation of aluminate and silicate of lime, containing each three instead of six equivalents of water, which is the case when a heat only sufficient to drive off the carbonic acid of the carbonate of lime is employed; and the decomposition which must take place before the final hydration also explains the slow setting. Pozzuolana is found not only at the foot of Mt. Vesuvius, but in various places in Europe: in Sicily, in Mauritius, in Guadeloupe and Martinique, and in several places in France. It is mixed, without calcination, with caustic lime. Sometimes, however, the lime is allowed to stand for several months after slaking before being used, and this practice is said in some instances to increase the hydraulic energy of the product, probably in consequence of the partial recarbonization of the lime facilitating the process of silicification which takes place between the lime and the alkaline silicates contained in the volcanic pozzuolana. A substance of volcanic origin called trass is found in the valley of the Rhine, which has long been much used, especially by the Dutch engineers, for hydraulic works in Holland, and

the Romans also employed it many centuries ago. It possesses qualities nearly identical with Italian pozzuolana, and is treated with lime in the same manner. It is of a grayish color, and lies in beds composed of fine particles and small lumps. The following table showing the chemical composition of pozzuolana and trass is taken from Wagner's "Chemical Technology:"

CONSTITUENTS.	Pozzuolana.	Trass.	
		Sol. in HCl.	Insol. in HCl.
Silica.....	44.5	11.50	37.44.
Lime.....	8.8	3.16	2.25
Magnesia.....	4.7	2.15	0.27
Potash.....	{ 5.5 }	0.29	0.03
Soda.....		2.44	1.12
Alumina.....		15.0	1.25
Oxide of iron.....	12.0	11.17	0.75
Water.....	9.2	7.65	....
Total.....	99.7	56.06	43.16

A hydraulic lime obtained at Teil, in the department of Ardèche, France, has been found to possess properties which eminently fit it for use in marine constructions, as it sets and hardens well in salt water. As analyzed by Prof. Rivot, it has the following composition:

THE UNBURNED STONE.	THE BURNED LIME.
Lime..... 46.8	Lime..... 73.29
Oxide of iron..... 0.7	Oxide of iron..... traces
Silica, quartz sand, and clay..... 15.0	Silica..... 13.20
Carbonic acid and water. 37.6	Alumina..... 1.80
	Quartz sand..... 1.71
Total..... 99.6	Total..... 100.00

—Various methods are employed for ascertaining the hardness and tensile strength as well as the power to resist pressure. The apparatus of M. Vicat for testing the hardness and determining the time of setting employs a pointed pin, which, by means of a suitably adjusted frame, is driven against the surface of a prepared brick of cement with any given force, and which is determined by different weights which are used as the motive power. The tensile strength is found by fastening each end of a brick in a suitable clamp or socket, and suspending it with a weight attached at the lower end. The force required to produce fracture in this case will represent the power of cohesion attained by the particles of the brick. The power of resisting pressure is found by placing a prepared brick, having perfectly plane sides, under a weight which may be increased at pleasure. The crushing and tractile force necessary to overcome the resistance of the cement may be found by mathematical calculation, by supporting a brick edge-wise and applying a weight in the middle, which will exert a crushing force at the upper, and a tractile force at the lower edge. The jetties which form the harbor at Port Said, the Mediterranean terminus of the Suez canal, were constructed of blocks of concrete made of hydraulic lime from Teil mixed with beach

sand, and exposed for several weeks to the action of the air. This has also been used with good results in the harbors of Marseilles and Toulon, and at various other places, in both fresh and salt water. The piers enclosing the harbor at the ocean terminus of the North sea canal of Holland are laid in Portland cement, and the same material enters into the structure of the Cherbourg breakwater. The foundations of Fort Tompkins and Fort Richmond in New York harbor are composed of concrete made of hydraulic cement, sand, and fragments of granite, in the proportion of one part of cement to three of sand and five of granite. Exterior stucco work is now to a great extent made of hydraulic mortar.—For further information in regard to the details of the technical manipulation employed in manufacturing, using, and testing hydraulic cements and mortars, see “Practical Treatise on

Calcareous Mortars and Cements,” by L. J. Vicat (London, 1837); “Observations on Calcareous Cements,” &c., by Major Gen. Sir C. W. Pasley, K. C. B. (London, 1847); Henry Reid’s treatises on Portland cement and on concrete (London, 1868 and 1869); the practical essay of A. Lipowitz on Portland cement (translated by W. F. Reid, London, 1868); the work of Dr. W. Michaelis, *Die hydraulischen Mörtel* (Leipsic, 1869); Gen. Q. A. Gillmore’s treatise on “Lime, Hydraulic Cements, and Mortars” (New York, 1872); and “Report on the Hydraulic Lime of Teil,” by Leonard F. Beckwith, C. E. (New York, 1873).—The following table of the composition of ancient mortars, with the names of the analysts, is taken from Mr. Reid’s treatise on concrete, and will be found interesting to peruse in connection with the various theories of the hardening of mortars:

CONSTITUENTS.	Pyramid of Cheops, interior.—Dr. W. Wallace.	Pyramid of Cheops, exterior.—Dr. Wallace.	Concrete from ruins of a temple in Cyprus, prehistoric.—Dr. Wallace.	White cement found in Cyprus used in joining red clay pipes.—Dr. Wallace.	From a part of the Pyrex.—Dr. Wallace.	Temple of Penticus.—Dr. Wallace.	Hadrian’s villa, at Tivoli.—Dr. Wallace.	Hall at Herculanum.—Dr. Wallace.	Roof of Latin tombs near Rome.—Dr. Wallace.	Mosaic mortar, Baths of Caracalla.—Dr. Wallace.	From the cathedral at Brandenburg, 600 years old.—M. John, Berlin.	From a Roman well at Cologne, 1,800 years old.—M. John.	From a Roman concrete on the Rhine.—M. John.	From a Roman tower at Bologna, 1,800 years old.—M. Viest.	From the ancient Garanium, at Burch, near Yarmouth, 1,300 years old.—J. Spiller.
Carbonate of lime...	9.47	9.80	...	...	...	...	...	...	...	...	...	...	...	...	...
“ of magnesia	0.59	0.79	...	...	...	...	...	...	...	...	...	...	...	...	...
Silicic acid.	5.30	4.80	...	...	...	...	...	...	...	...	...	...	...	...	...
Alumina.	2.41	3.00	2.16	0.40	2.64	...	14.70	2.86	16.39	10.64	...	...	...	...	...
Hydra’d sulph. lime	1.50	82.89	...	...	...	...	...	...	...	...	...	...	...	...	...
Oxide of iron.....	80.25	0.21	0.90	...	0.92	0.82	4.92	2.32	4.23	3.67	...	...	...	...	...
Lime.....	...	...	26.40	51.58	45.70	49.65	15.30	29.88	19.71	25.19	...	...	...	...	...
Magnesia.....	...	...	0.97	0.70	1.00	1.09	0.30	0.25	0.71	0.90	...	...	...	...	...
Potash.....	...	...	...	...	...	...	1.01	3.40	...	...	...	...	...	...	...
Soda.....	...	...	...	...	...	...	2.12	3.49	...	...	...	...	...	...	...
Carbonic acid.....	...	...	20.23	40.60	37.00	38.83	11.60	23.80	13.61	17.97	...	...	...	...	...
Sulphuric acid.....	...	...	0.21	0.82	...	1.04	...	...	...	...	...	...	...	...	...
Silicic acid and fine sand.....	...	...	16.20	0.96	12.06	3.90	41.10	33.36	36.26	30.24	...	...	...	...	...
Organic matter.....	...	...	0.56	0.24	...	...	2.28	1.50	...	2.48	...	...	...	...	...
Coarse sand.....	...	...	3.37	...	...	...	...	...	...	...	...	...	...	...	...
Small atoms.....	...	...	28.63	...	...	...	...	...	...	...	...	...	...	...	...
Water.....	...	...	54	3.09	0.36	3.07	5.20	1.00	8.20	5.60	...	...	...	...	...
Total.....	99.52	100.99	100.26	98.39	99.68	98.40	98.73	101.86	96.11	96.59	...	...	...	...	...

—The mastics and other oily cements of London have nearly gone out of use on account of their want of durability. They were compounds of lime, sand, litharge, and linseed oil. Gypsum and gypseous cements are much used for internal plastering and decoration. The rapidity with which plaster of Paris sets when mixed with water makes it an article of great value. The gypseous cements mostly used in England are Keene’s and the Parian. The former is obtained by recalcining plaster of Paris which has been slaked with a saturated solution of alum and water, and again slaking it with a saturated solution of borax. Bituminous cements are employed as substitutes for flagging in paving streets, and to protect the extrados of arches from the effects of water; and for this they have much utility, because in all new masonry there are movements which fissure the coatings made in hydraulic cements, so that it is almost impossible to render them impermeable to water, and the elasticity of

bituminous cements is well calculated to overcome the defects of the more unyielding stony compounds and render them particularly serviceable in making repairs. They are made from natural asphaltum, which is mixed with chalk or carbonate of lime, or with hydraulic cement. A cement which is made in Silesia for covering roofs is composed of Portland cement, coal or wood tar, and a small portion of sulphur. Among the resinous cements are Varley’s, which is made by drying by means of a red heat 16 parts of pulverized whiting, and when cold stirring it in a melted mixture of 16 parts of black resin and one of beeswax. Singer’s electrical and philosophical apparatus cement consists of 5 lbs. of resin, 1 lb. each of beeswax and red ochre, and two tablespoonfuls of plaster of Paris, melted together. The ochre and plaster should be previously calcined, and added after the other ingredients are melted. Lapidaries’ cement for holding gems while they are being cut is made of resin and red ochre or

Spanish brown, melted together and tempered with a little beeswax and tallow. Opticians' cement, for a similar purpose, the fixing of glasses for grinding, is made of sifted wood ashes and melted pitch. White lead cement, made by grinding linseed oil varnish and white lead together, is used for repairing fractured bodies of all kinds, but requires a considerable time to harden. Plumbers' cement is made of two parts of brick dust and one of black resin melted together. Iron rust cement is made by mixing 50 or 100 parts of iron filings with one part of sal ammoniac. When used it is moistened with enough water to form a paste. The subsequent rusting and the consequent packing of the joints to which it may be applied gives it a particular value. Sometimes clay may be added to the mixture with advantage. A solution of shellac in alcohol, added to one of isinglass in proof spirit, makes a cement which has considerable power to resist the action of moisture. Common glue, melted with half its weight of resin and a small quantity of red ochre to impart body, is used in cementing hones to their frames. A strong cement for stoneware is made by boiling the cheese of skimmed milk in a large quantity of water, and incorporating the solution with quicklime in a mortar. It may be used cold, but it is better to warm it. It joins earthenware, marble, or any kind of stone so that the seam can scarcely be discovered. A cement composed of from four to six parts of potters' clay and one of iron filings, with enough linseed oil to form a paste, makes a cement which is often used in stopping cracks in steam boilers. In the distillation of caoutchouc, the residue left in the retort, when again mixed with the distilled oil, or caoutchoucine, forms an elastic cement which is much used by shipwrights; and another tenacious cement is made by dissolving one part of caoutchouc in four parts of coal tar, adding two parts of shellac, and heating the mixture in an iron vessel.

CEMETERY (Gr. *κοιμητήριον*, a sleeping place), a place appointed for the burial of the dead. In rude states of society the dead are often buried in any place that may be found most convenient, by the side of some road, or in some vacant spot in the city; but even in very ancient times grounds were often set apart which were especially appropriated for the reception of the dead. The Hebrews had public burial grounds, and their first care upon arriving in a new country was to select a plot and reserve it as a burial place. Every city had one outside of its walls, that of Jerusalem being in the valley of Kedron. Ruins and mummies have been found in Babylonia and Egypt which show that the burial places in those countries in former times were of immense extent. Although the Greeks in later times adopted from Phrygia the custom of burning the dead, yet their custom originally was to provide cemeteries. Among the Romans also the more ancient practice was the appropriation of ground for

interment; and even after incineration had been introduced, the practice continued, and the Appian way was lined with sepulchres as well as with funeral urns. The early Christians would seem to have introduced a somewhat different practice. The laws of the twelve tables had prescribed that the dead should not be buried within the walls of the city. The early Christians, however, erected some of their churches upon plots of ground in which were interred the remains of martyrs, and around others reserved an open space which was consecrated for the reception of their dead. In the middle ages also churchyards were used for cemeteries. Even the churches themselves were occupied in part for tombs, and crypts and vaults were excavated beneath their floors. The church, deriving a considerable revenue from the burial of the dead, inculcated the importance of burial in consecrated ground, over which it retained control. To this day the older churches in large cities are surrounded by graves, and in small towns and villages the burial ground is usually near the church. The increase of population and a better knowledge of the laws of health have in a measure restored the ancient practice, and cemeteries are at the present day generally provided without the limits of all large towns and cities.—There are many cemeteries which are celebrated. Those around the city of Constantinople have become very extensive on account of the practice of invariably opening a new grave for each corpse, it being considered sacrilege to disturb the dead. The practice is also to plant a cypress by the grave of every Mussulman, so that the cemeteries of Constantinople are embowered in forests. Those of Scutari and Pera are the most noted. The cemetery of Pisa in Italy, called the *Campo Santo*, is a beautiful oblong court, 490 ft. long and 170 ft. wide, surrounded by arcades of white marble 60 ft. high, and adorned with ancient Etruscan, Greek, and Roman bass reliefs and other sculptures, and with paintings by the early Italian masters. In its centre is an enormous mound of earth said to have been brought from Palestine during the crusades, and formerly used as a burial ground. This cemetery is the Pantheon of the Pisans, and among its most famous monuments is the tomb of Algarotti, erected by Frederick the Great in 1764. It has given its name to burial grounds throughout Italy. The *campo santo* of Bologna is one of the finest of them. It is without the city, and was anciently a Carthusian monastery called Certosa, having been consecrated as a cemetery in 1801, when burials within the city were prohibited. The church of the monastery has been preserved, and is adorned with fine paintings. The cemetery occupies the corridors of two of the cloisters of the convent. Niches have been built in the walls for the reception of the dead. There is a large hall in which are placed the busts of those who have been eminent for learning. Some

of the tombs and monuments are of beautiful design, those of Pope Alexander V., Francesco Abborgato, and Sigismondo Malvezzi being especially remarkable. The campo santo of Genoa is about two miles from the city, upon the slope of a hill in the valley of the Bisagno. It is quadrilateral, and upon the sides are terraces, beneath which are excavated the vaults. In the centre is a circular chapel, with a dome supported by 16 Doric columns on each side, of dark Corsican marble. The cemetery contains works by some of the best sculptors of Genoa. It was commenced in 1838, after designs of Resasco, a Genoese architect. There is a curious cemetery near Naples. It is a parallelogram 300 ft. in length, on three sides of which is a lofty wall, and on the fourth an arcade. It contains 366 deep pits, some of which are under the arcade and others in the open space in the centre. Every morning a pit is opened, and in it are deposited all the dead bodies which are brought during the day. At evening a funeral service is performed over the entire number. Of other campi santi the most interesting are at Ferrara, Brescia, Parma, and Verona; and among the more recent and extensive is that of Milan. A campo santo after the plan of that of Pisa has been projected in Berlin, to serve as a royal burying place and to adjoin a new cathedral. Cornelius designed for this some of his most celebrated frescoes, but the building remains unfinished.—One of the acts of the constituent assembly of France in 1791 was to prohibit interments within the limits of cities, and to require the establishment of cemeteries outside of those limits. In 1804 four were authorized, one of which, Père Lachaise (now within the *enceinte*), has become the best known. It was laid out upon the estate called Mont Louis, which was presented by Louis XIV. to his confessor Père de Lachaise. It contains the tombs of many illustrious persons, among which are those of Abélard and Héloïse, La Fontaine, Molière, Beaumarchais, Delille, Talma, Bellini, Weber, Laplace, Cuvier, Casimir Périer, Arago, Benjamin Constant, Börne, Royer-Collard, Marshal Ney, the painter David, Sieyès, Barras, Frédéric Soulié, Balzac, and many others. Its highest elevation commands the city on one side and the surrounding country on the other. Its hills and valleys are covered with every variety of column, obelisk, pyramid, funeral vase, and sculptured flowers and garlands. In England the French example has not been followed, and burials are allowed within the limits of cities, sometimes even within churches. In Russia the cemeteries are at a distance from the cities and villages, and planted with pines. In the United States great attention is paid to the embellishment of cemeteries. Many of them are spacious, laid out with taste, and planted with trees. The most noted and beautiful are Mount Auburn near Boston, Greenwood in Brooklyn, and Laurel Hill near Philadelphia. The principal cemeteries in this country will

be described in connection with the cities near which they are situated.

CENCI, Beatrice, a beautiful Roman girl, born about 1583, executed in September, 1599. She was the daughter of Francesco Cenci, who inherited great wealth from his father, the treasurer or minister of finance of Pius V. Francesco was a man of bad character and dissolute habits, but was able through his large fortune to escape the punishment of his crimes. Of the children by his first wife two were murdered. Beatrice was the eldest of the three who survived. His second wife, Lucrezia Petroni, and Beatrice were taken by Francesco to Petrella, a desolate castle among the Sabine hills near the Neapolitan frontier. There Beatrice and her stepmother were subjected to every species of ignominy and insult. It was said that Beatrice was forced by her father to submit to incestuous intercourse. She vainly appealed to Pope Clement VIII. for protection, and then she and her mother resolved to rid themselves of their persecutor. Monsignore Guerra, who afterward became Beatrice's lover, united with them, and they employed two assassins to waylay and kill Francesco as he was returning to Petrella. But the attempt failed. Beatrice and her mother afterward, on Sept. 9, 1598, drugged Francesco, and Beatrice introduced assassins into his room, and he was killed while asleep. One of the murderers made a confession, and Beatrice, her stepmother, and her two brothers were charged with the instigation of the crime and subjected to torture. Lucrezia and the elder brother, Giacomo, admitted their guilt; but Beatrice, though but a girl of 16, long persisted in maintaining her innocence. The Cenci family were connected with the most illustrious houses of Rome, and strong intercessions were made on behalf of the accused. The great advocate Farinacci was heard in their defence. He urged in extenuation of their course the vices and crimes of the murdered man. He succeeded in obtaining the acquittal of the younger brother, Bernardo, his guilt not having been proved; but while the fate of the others remained undecided, the princess of Santa Croce was murdered by her son, and the pope resolved to make an example of Beatrice, Lucrezia, and Giacomo. They were all executed, Beatrice displaying the most heroic courage to the end. In her last will she directed that her property should be appropriated for furnishing dowries to young girls. Her remains were interred at Montorio in the church of San Pietro. The vast estates of the family, including the celebrated villa Borghese, were confiscated and bestowed upon members of the Aldobrandini and Borghese families, relatives of Pope Clement VIII. and the future Paul V. The youth and beauty of Beatrice were so great that her execution sent a thrill of horror through Rome. The people would not believe that she had been guilty, and charged the government with having condemned her in order to obtain

possession of the estates of the Cenci family. The indignation was so strong and so lasting that these estates were finally in part restored to the heirs of Giacomo Cenci. The family assumed the name of Bolognetti in addition to that of Cenci, and for a long time were involved in lawsuits with the Borghese family in regard to the Cenci estates. Muratori's "Annals" is one of the authorities in regard to Beatrice Cenci. Her story is told in an article in the "Quarterly Review" (1858) as derived from a contemporary manuscript; and in the *Storia di Beatrice Cenci*, by Carlo Tito Dalbano (Naples, 1864), the original documents and judicial proceedings which relate to it are cited. De Custine has founded a drama, *Guerrazzi* a novel, and Shelley a tragedy upon the story. *Il processo criminale della Beatrice Cenci*, by Antonio Torrignani, in refutation of Guerrazzi's historical romance *Beatrice Cenci*, was published at Florence in 1873. The celebrated portrait of Beatrice, which is said to have been painted by Guido Reni immediately before her execution, is in the Barberini palace at Rome. Its authenticity is doubtful.

CENEDA, a town of Italy, in the province and 22 m. N. of Treviso; pop. about 8,000. It is the see of a bishop, and possesses a cathedral, several churches, manufactories of leather, woollens, and paper, and mineral springs.

CENIS, Mont, a mountain between the province of Turin in Italy and the department of Savoie in France, at the junction of the Graian with the Cottian Alps. It is an elevated plateau 6,773 ft. above the sea level, with a peak rising to the height of 11,457 ft. On the plateau is Lake La Ramasse, noted for its fine trout. There is little vegetation, on account of the force of the winds which blow constantly. Over this plateau or neck, formed by a gradual sinking northward from the summit of the chain, is what is styled the pass of Mont Cenis, at some distance from the mountain itself. As a practicable pass from Gaul to Italy it was unknown to the ancients. Two centuries before Christ, Hannibal went past it for 40 m., and is supposed to have crossed the Alps at the Little St. Bernard. It first appears in history as an Alpine pass in A. D. 755, when Pepin led his army against Astolphus, king of the Lombards, in aid of Pope Stephen III. Pepin's son Charlemagne led an army over the same route. In 1174 it was crossed by Frederick Barbarossa. In 1557 the duke of Alva passed over with a Spanish army to quell the revolt in the Netherlands. In 1691, in the wars of Louis XIV., Marshal Catinat led the French army across, and made some improvement in the road; but for centuries it was little more than a mere mule path. In 1803 Chevalier Fabroni, under the orders of Napoleon, began the construction of a carriage road, which was completed in 1810, at a cost of 7,500,000 francs. This highway, 18 ft. wide, extending from Saint-Michel on the western side to Susa on the eastern, would give a distance in a straight line of 30

m., but the windings of the road make it 50 m. An excellent diligence service was established; horses were changed as rapidly as on the best post roads; and at the zigzags, beginning at Lanslebourg on the west side, teams of 16 mules were attached to drag the diligence up the steepest ascents, while many of the passengers dismounted and materially shortened the distance for themselves by walking directly across the long curves. The road was open and safe at all seasons, even in winter, and for many years it was believed to be the only practicable way of crossing the Alps at this important point. Meanwhile railways on either side had reached the foot of the mountains, and about 1861 Mr. Fell, an English engineer, con-



Mont Cenis Railway.

ceived the idea of overcoming by steam transit the gradients of the pass, by applying a principle patented more than 30 years before by Charles Vignolles and John Ericsson, and first tried by them on the Cromford and High Peak railway in England. In 1865 Fell obtained from the French and Italian governments a grant to lay down a railway on Napoleon's Mont Cenis carriage road; it was constructed at a cost of £8,000 per mile, and opened in 1868. The main feature of his plan was the addition of a third central rail, raised a foot above the others, and, by means of brakes and levers, strongly gripped by horizontal driving wheels, thus enabling trains to traverse curves of short radius, and safely to ascend and descend gradients of 1 in 15, and even 1

in 12. From Lanslebourg the track reaches the summit, 4,460 ft. above Saint-Michel, in six zigzags, with a gradient of 1 in 15 to 1 in 12½, in a distance of 6¾ m. At the summit there is a nearly level run of 5 m., and then begins the descent on the Italian side to Susa, over a line extended to a length of 20 m. by a series of zigzags so continuous that the view changes every moment. The train slides down by its own momentum, and all the mechanical power is applied to the centre brake which checks and regulates the speed. But as this road superseded Napoleon's carriage road, on which the greater part of the line was laid, so it in turn has been superseded by the Mont Cenis tunnel railway, completed in 1871. While it was in use travel was occasionally suspended by snow and floods, though wherever there was danger from avalanches the line was thoroughly protected by covered galleries. The idea of a tunnel through the Alps was conceived more than 40 years ago. In 1832 Joseph Medail, a peasant of Bardonecchia, presented to the king of Sardinia a plan for connecting Piedmont and Savoy by a railway tunnel from Bardonecchia to Modane; and in 1843 this plan, accompanied with many particulars, was approved by the chamber of agriculture and commerce at Chambéry. In 1845 the Sardinian government invited the engineer Maus and the geologist Sismonda to prepare designs for making a tunnel through Mont Cenis; and Maus, turning his attention to creating a machine for cutting rock rapidly, was ready in 1849 to present to the commission at Turin a plan for tunnelling the Alps. The defects of his plan were the cost, want of ventilation, and waste of motive power. Daniel Colladon of Geneva discovered more perfect means of ventilation, and also of transmission of force; and an English engineer, Thomas Bartlett, invented an ingenious machine for rapidly perforating rocks. These two inventions, modified by the engineers Sommeiller, Grandis, and Grattoni, with further plans of their own, were presented to the Sardinian parliament in June, 1856, and experiments for perforating the Alps were authorized and begun at Coscia. These were so successful that parliament approved the project of the Alpine tunnel, and the work was inaugurated by the king of Sardinia, who fired the first mine Aug. 31, 1857. In October and November piercing by hand was begun at the two extremities, and a large force was also employed in the construction of roads, water channels, magazines, offices, storehouses, and houses for workmen. The waters of the Arc on the north side, and of the Melezet on the south, were utilized for the hydraulic machines which compressed the air supplied to the tunnel. In January, 1861, the perforating machines, worked by compressed air, were introduced on the south side at Bardonecchia, and in January, 1863, on the north side near Modane. The work was carried on successfully night and day till Dec. 26, 1870, when

the two bodies of workmen met and the tunnel through the mountain was complete. The progress of the perforation, nearly 8 m., was as follows: on the Bardonecchia side, from 1857 to 1861, by hand, 2,379 ft.; from 1861 to 1871, by machines, 20,851; on the Modane side, from 1857 to 1863, 2,366; from 1863 to 1871, by machines, 13,886; total for the two entrances, 39,482 ft. The mechanical means were water-column compressors, pump compressors, and perforating machines. The number of workmen employed was 1,500 in winter and 2,000 in summer at each entrance. When Savoy in 1860 was annexed to France, an agreement was made between the French and Italian governments by which Italy was to execute the entire work within ten years, receiving from France about 32,000,000 francs for one half of the expense. The total cost of construction was about 75,000,000 francs, or \$15,000,000. The Mont Cenis tunnel (improperly so called, as it is 16 m. from the mountain) was opened for railway travel Sept. 17, 1871. The elevation of the southern entrance above the sea is 4,237 ft.; of the northern entrance, 3,802; of the culminating point, 4,247. The tunnel is broad enough for two double lines of rails. The railway does not run in a straight line through the tunnel; the entrances are left open only for ventilation, and the tracks are laid in junction tunnels, on the south of the length of 2,484 ft., and on the north of 1,488. (See TUNNEL.)

CENOBITE (Gr. *κοινός*, common, and *βίος*, life), a person who lives in community with others under a common rule. The term is usually applied to the members of some religious association who live in common. In very ancient times the Brahmans of India formed such associations. St. Pachomius established a *cenobium* or monastic institution on Tabennæ, an island of the Nile, in the year 340. Those members of religious orders living in cloisters and convents were called cenobites, as distinguished from the anchorites who lived in solitude.

CENSER, a vessel for burning and wafting incense, used in the celebration of religious rites by the ancient Hebrews, Greeks, and Romans, and still retained in the Roman Catholic church. The Hebrew censer appears to have been a sort of chafing dish, with or without handles, which the high priest carried into the sanctuary or placed on the altar of incense. That used in the Catholic church, also called a thurible, is a vessel shaped much like a goblet, with a perforated lid, swung by long chains, and carried by an acolyte.

CENSOR (Lat. *censere*, to estimate), the title of Roman magistrates of high dignity and great influence, instituted in the year 443 B. C. The office was vested in two persons, originally elected for five years, from and by the patrician order; but later changes introduced by the dictator Mamercus, 433 B. C., and afterward, reduced the term of the office to 18 months, and made it attainable by plebeians, of whom

Rutilus, who had also been the first dictator of that order, was the first elevated to this dignity (351); and in 131 even both censors were plebeians. They had all the ensigns of consular dignity except the lictors, and wore a robe of scarlet. Their office was to take the regular census and keep the rolls of all Roman citizens, to distribute them according to orders, tribes, &c., to value, register, and tax their property, to control public morals and manners, to fill remarkable vacancies in the senate, to choose the *princeps senatus*, to manage the farming of the revenues, customs, and salt monopoly, to contract for repairs of public buildings and roads in Rome and Italy, &c. They had the right of punishing moral and political transgressions committed by citizens of distinction with marks of ignominy, by expulsion from the senate, and even by degradation from a higher to a lower order; for which punishments the ill-treating of members of their families, extravagance, and the pursuit of mean professions, were regarded as sufficient reasons; but their decisions were subject to an appeal to the assembly of the people, and themselves to its jurisdiction. The dignity of censor was regarded as most honorable, and originally only those were eligible who had passed through all other offices. The emperors assumed it under the title of *morum præfecti*; Decius desired to restore it independently under a particular officer. The brother of Constantine the Great was the last censor.

CENSORINUS, a Latin grammarian and chronologist of the 3d century. He wrote a treatise upon accents, cited by Cassiodorus, but lost. Only a fragment of his work *De Metris* is extant. He is known principally by a curious work entitled *De Die Natali*, treating of the generation of man, his natal hour, the influence which the genii and stars exercise over his destiny, and of the climacteric periods of his life. He also discusses music, religious rites, and matters relating to astronomy, chronology, and cosmography. By this work the commencement of the era of Nabonassar and other dates have been fixed, and Censorinus has therefore been named by Scaliger *eximius et doctissimus temporum vindex*. The first edition of Censorinus is in quarto, without date, place, or printer's name; the second was that of Bologna, in 1497; the last is a German edition, by Gruber, in 1805.

CENSORSHIP OF THE PRESS, a regulation by which books, pamphlets, and newspapers are subjected to the examination of certain civil or ecclesiastical officers, who are empowered to authorize or forbid their publication. Such a regulation was suggested by Plato, and an informal censorship existed in the times of Greece and Rome. Thus all the copies of the works of Protagoras were burned at Athens by sentence of the areopagus, because he had expressed doubts concerning the existence of the gods. Satirical works and writings on magic were often condemned to the flames by the Roman

emperors, and Diocletian ordered the sacred books of the Christians to be burned. After the church acquired a share in the civil power, it induced the state to condemn heretical books, and the writings of Arius were burned by edict of Constantine. Subsequently there were numerous enactments by popes and councils against the works of heretics, sanctioning the principle that books objected to by the church should be suppressed. This principle was maintained throughout the middle ages, authors often as a voluntary act of respect submitting their works before publication to the judgment of the higher clergy. The first eminent instance of this kind was that of Autpert, a Benedictine monk, who in 768 sent his "Exposition of the Apocalypse" to Pope Stephen III., begging him to publish the work and make it known. The invention of printing and the increasing number of books called forth new and stricter prescriptions of censorship, and there still remain copies of books printed in 1479 and 1480 which are accompanied with solemn approbations and attestations in their favor. In 1486 Berthold, archbishop of Mentz, issued a mandate forbidding the publication of any work in the German language unless it should be first read and approved by one of four censors whom he appointed. Shortly after Pope Alexander VI. addressed a bull to the archbishops of Cologne, Mentz, Treves, and Magdeburg, according to which no book should be printed without special express license from the clergy. Finally, in 1515, the council of the Lateran, assembled at Rome, decreed that in future no books should be printed in any town or diocese unless they were previously inspected and carefully examined by the bishop of the diocese or his deputy, or by the inquisitor of the diocese or his deputy, or if at Rome by the pope's vicar and the master of the sacred palace. Every work which was approved was to be countersigned by the hand of the censor, and any publication not thus countersigned was to be burned and its author or editor excommunicated. Thus was a general censorship of the press consummated by the Roman Catholic church, which has since been enforced by that church in countries where it has had the power. Its "Index of Prohibited Books" was begun by the council of Trent, and has been from time to time republished and enlarged. It has also an "Index of Expurgated Books."—In countries where the reformation prevailed, the censorship was not abolished. Censors of books were appointed in England, who were for the most part bishops; and in the reign of Charles I. complaints were laid before the house of commons against Archbishop Laud and his associates, because, as was alleged, it was impossible to obtain from them permission to publish a book written against popery. A general system of censorship was established by a decree of the star chamber, dated June 11, 1637, which remained in force during the civil war, and was confirmed by an act of par-

liament in 1643. It was against this act that Milton wrote his "Areopagitica: a Speech for the Liberty of Unlicensed Printing." "Paradise Lost" itself was in danger of being suppressed because the simile of Satan compared with the rising sun, in the first book, was supposed to contain a political allusion. Parliament took several measures against "scandalous, seditious, libellous, and unlicensed pamphlets." In 1653 the council at Whitehall ordered that no person should print any matter of public news or intelligence without leave of the secretary of state. The licensing system, and with it the censorship of the press, was abolished in England in 1694 in the reign of William and Mary, but the question of its revival was agitated in parliament some time later.—A general censorship of the press existed under the old French monarchy. Originally in the hands of the bishops, it passed by degrees to the doctors of the faculty of theology; but this faculty becoming divided into parties on matters of controversy, the chancellor of the kingdom took the censorship from it in 1653. He appointed four royal censors with an annual stipend to examine all works without distinction, and no writing could be printed or sold, and no dramatic piece performed, unless approved by one of them. At the outbreak of the revolution the censorship was abolished and entire liberty of the press proclaimed, but in the reign of violence which followed there was no safety for obnoxious journals or writers. Napoleon during the consulate limited the freedom of the press to works of a certain size, but subjected newspapers and pamphlets to a strict inspection. By a decree of the council of state in 1810, a complicated system of censorship was revived in France. Even after a book had been examined, approved, and printed, it could be seized by the minister of police and its sale stopped, a memorable instance of which was the destruction of the whole first edition of Mme. de Staël's *De l'Allemagne*. After various modifications of the censorship, Charles X., upon coming to the throne, abolished it altogether, but soon after suspended the liberty of the periodical press. This was one of the causes of his fall in 1830, after which the press once more became free. Under the empire of Louis Napoleon the Parisian newspapers were subjected to strict supervision and occasional suppression; and the republic of 1870 maintains the same system. A general censorship of the press is maintained in Russia. By the Spanish constitution of 1837 the previous censorship was abolished, and all Spaniards may print their thoughts freely, subject only to the laws. The determination of offences committed by means of the press belongs to juries impanelled for that purpose. In Switzerland since 1830 no censorship has existed, but the liberty of the newspaper press is very much restricted by laws. By the constitution of the kingdom of Greece of 1827, the Hellenes have the right of publishing freely their thoughts, abstaining

however from violations of decency, from personal calumny, and from attacking the principles of the Christian religion. In Sweden, Norway, the Netherlands, Belgium, and Denmark, no authoritative censorship exists, but upon those who offend through the press penalties of various degrees of severity are imposed. These penalties are most rigorous in Denmark. The liberty of the German press has been even more unsettled than the political government of Germany. While the emperors of the house of Austria had vainly sought to establish uniform rules to check the press in all the states, Frederick the Great granted uniform liberty to the press in his dominions, "because it amused him." During the ascendancy of the French republic the press was arbitrarily checked in most of the states, though it was free in Bavaria, Holstein, and occasionally in Hesse and Mecklenburg. The censorship was subsequently abolished in some of the smaller states, as Nassau, Würtemberg, and Saxe-Weimar; but a congress of the German rulers, assembled at Carlsbad in 1819, extended it over all printed publications under 20 sheets. Permission also had to be obtained for selling foreign books. The French revolution of 1830 prompted the German people to demand complete freedom from the censorship, except in cases specified by the diet; but though liberal regulations were obtained, they were upheld only a short time, and there was a gradual reaction toward the decree of Carlsbad. The movements of 1848 everywhere established the freedom of the press; and though the subsequent reaction curtailed it here and there, the censorship has since remained abolished. In the United States of America there never has been a censorship of the press. There are laws against publications of a scandalously immoral character, but in general the only restraint upon printing or circulating any class of books is found in the public sentiment.

CENSUS, an official enumeration of persons and their property, generally with such facts as tend to show their moral, social, physical, and industrial condition. In the Pentateuch the enumeration of the people is repeatedly enjoined, and the most ancient statistical record of the kind is that of Moses in the wilderness. There is record of a census in China ordained by the emperor Yee 2042 B. C., and of one in Japan under the mikado Sujin in the last century before Christ. Under the constitution of Solon, the citizens of Athens were divided and registered (τμήματα, τέλη) into four classes, according to the amount of their taxable property or income. The Roman census originated in the distribution of citizens into classes effected by Servius Tullius, the sixth king of Rome, in a most solemn manner on the Campus Martius, where every citizen had to appear, and to declare upon oath his name and dwelling, the number and age of his children, and the value of his property, under the penalty of having his goods confiscated, and of being scourged

and sold for a slave. The whole population was divided into six classes based upon property qualifications, each comprising a number of centuries. Augustus, who had the population numbered, enlarged the scope of the census, and improved the mode of taking it.—In the 16th century the practice of keeping church registers of births, marriages, and deaths, out of which grew the modern systems of recording the movements of the population, came into use. No exact popular enumerations were made in the 17th century, but in the 18th great progress was made in the development of statistical science. In Russia partial censuses were taken by order of the government in 1700, 1704, 1705, and 1710. In 1719 a commission was organized by Peter the Great to visit the principal provinces of the empire for the purpose of making a general census. The commission was charged to ascertain the number of peasants, mechanics, domestics, and persons without regular employment. The whole population was returned excepting females, who were omitted because the census was taken solely for purposes of revenue and military conscription. Females, however, were subsequently included, but returned with less exactness than the males. In 1722 insane and infirm persons without means of subsistence were included in the enumeration, and it was ordered that a census should be taken at intervals of twenty years. Accordingly enumerations were taken in 1742, 1762, 1782, and 1796. The taking of the census was eventually vested in the central administrations of the provinces, which were held responsible for its correctness. As early as 1802 a "central bureau of statistics" was organized under the direction of the ministry of the interior, to which the results of the statistical inquiries of the several departments of the government were transmitted, and which published from time to time statistical exhibits of the public administration, population, territorial extent and subdivision, agriculture, commerce, and industry of the empire. The central bureau of statistics was reorganized in 1852, and again in 1858, under the name of "central statistical commission," which has charge of the preparation and publication of statistical information of various kinds; but one of its chief functions is the enumeration of the population. Censuses were taken in 1812, 1815, 1834, 1851, 1858, and 1867. Formerly the range of inquiries was very limited, but in the most recent censuses has been extended so as to include the legal population by sexes; the number of houses in towns, and of estates in villages and country; and the number of churches and chapels, benevolent institutions, schools, fairs, markets, post stations, and manufacturing establishments. The census is taken by means of printed schedules which are distributed and collected by the local administrative authorities. The time in which the census is to be taken is fixed by the government, a longer time being

allowed for the Asiatic than for the European provinces. The digesting and publication of the returns devolve upon the central statistical authorities. A separate mode of taking the census prevails in the province of Finland, which has a special statistical bureau. It is taken by the civil authorities in conjunction with the clergy, and relates exclusively to population.—In Prussia census taking dates from the time of Frederick William I., by whom measures were instituted to ascertain the number of the population. This was done through officers of the government, not by an actual enumeration, but by calculations based on various data. This imperfect system was greatly improved by Frederick II. From 1748 to the close of the century an enumeration of the inhabitants, under the direction of the superior authorities of each province, was made annually, except during a few years when it was prevented by war. In 1805 a central bureau of statistics was organized, which has existed with progressive changes in its constitution to the present time. It embraced within its functions general statistics; births, marriages, and deaths; schools and churches; medical statistics; and statistics of mechanical trades and manufactures. At first inquiries into these various subjects were made annually; but after 1820 annual inquiries were made only as to the general movement of the population and births, marriages, and deaths, information relating to the other subjects being collected once in three years. Upon the establishment of the customs union in 1834, the existing system of triennial population censuses was adopted. At first the inquiries related to the actual population, according to the age, sex (arranged in yearly classes), birthplace, and civil condition; mental and physical disabilities; school attendance, religion, immigration, and emigration. In 1840 the enumeration was made by names, which resulted immediately in a large increase in the population returns. In 1846 the number of families was determined; in 1849 the distribution of the population by habitations; in 1858 the number of persons of each sex between 17 and 45 years of age was returned in five classes; in 1861 the unmarried and widowed were specially classified, and inquiry was made as to the language spoken, and the social condition and occupation of the people. The Prussian census is taken by civil officers in December, on one day, by means of printed schedules. Besides the census, extensive statistical information relating to a great variety of subjects is prepared and published by the statistical bureau, and by the several departments of the government. In most of the minor German states the census is taken triennially under the regulations of the customs union, and differs but little from the Prussian system. In Bavaria, besides the triennial census, a more extended one is taken every 12 years. The first census of the new German empire was taken Dec. 1, 1871.—The first census in Aus-

tria was taken in 1754, and was followed by a general enumeration of the population at triennial periods. Until 1857 this information was obtained for military purposes; but in that year a new census law was made which provided that a census should be taken every six years by the civil authorities, and should embrace an enumeration of the population and the useful domestic animals. Printed schedules, with detailed instructions, are distributed by municipal and administrative officers, to be filled up by the heads of families, owners of tenement houses, and those in charge of convents, schools, and public institutions. Any person refusing to furnish the required information is liable to punishment by fine and imprisonment. The inquiries relate to the composition of families, including servants, age, sex, names, and titles, civil state, social condition, religion, occupation, marriages, births, and deaths, and the number of cities, towns, hamlets, villages, dwellings, and renters. The number of Austrian subjects living in foreign parts is obtained through the imperial legations. The census returns are tabulated and published by the "central statistical commission," under whose direction many other statistical inquiries are carried on.—In Sweden the science of statistics has been more particularly cultivated than in any other country. As early as 1686 a law was promulgated requiring the clergy to keep registers of marriages, legitimate and illegitimate births, deaths, persons removed from or settled in the parishes, and of the inhabitants arranged by habitations and households. This information was tabulated, and published for the first time in 1746 by the Stockholm academy of sciences, for the purpose of showing the total population of the realm. After 1749 annual consolidated returns were made by the clergy. In addition, general censuses were taken at irregular intervals from 1749 to 1775, and subsequently at quinquennial periods. These censuses exhibited the number, sex, age, and occupation of the inhabitants; the number and sex of married and single persons, widows, and widowers; the number of blind, deaf and dumb, and insane; of pupils attending schools; of persons not belonging to the established church; and the number of inmates of hospitals, asylums, and prisons. To these was added in 1804 the number of vaccinated persons; in 1821, the number of first, second, and third marriages, the age of the married, the number of legitimate children deceased when less than a year old, and the number of immigrants and emigrants; in 1831, the number of marriages, births, and deaths among all classes, the number of legitimate and illegitimate children, still-born, and deceased in their second and third year, by months; the number and age of persons deceased in hospitals, asylums, and prisons; and the movement of the population not belonging to the established church. The census is taken every five years, by means of

printed schedules, through the joint agency of the civil authorities and the clergy. The most recent was taken Dec. 31, 1871. A separate census is taken of the Laplanders and Finns. The governors of provinces are required to prepare every five years statistical summaries upon a variety of subjects not included in the census. A central statistical bureau was organized in 1857, charged with the superintendence and publication of population and other statistics. There has been a decennial census in Norway since 1815, the last having been taken Dec. 31, 1865. Inquiries are made as to age, sex, civil state, number of families and inhabitants, useful domestic animals, and the territorial area of each district. Annual exhibits are made up of births, marriages, and deaths; of commerce and navigation; of the administration of justice; and of the population suffering from physical or mental disabilities.—General censuses were taken in Spain in 1787 and 1798. The next one was taken in 1857, and was followed by another in May, 1860, which is the last general census. The population was, however, determined by calculation in 1867. The inquiries relate to name, sex, age, birthplace, civil condition, occupation, physical disabilities, degree of education, school attendance, habitation, and the distribution of population in cities, towns, villages, and hamlets. The census is taken in one night, by government officials charged with the collection and consolidation of the returns.—In Denmark a general population census was taken every five years between 1840 and 1860. It is now decennial, the last having been taken Feb. 1, 1870. The movement of the population is ascertained by means of civil registers.—The first direct and simultaneous enumeration of the people throughout the kingdom of Portugal was made Jan. 1, 1864, in pursuance of a law passed the preceding year, providing for a decennial census. The enumeration, made by means of household schedules, was completed in one day, and comprised inquiries as to sex, age, civil condition, occupation, nationality, habitual or accidental sojourners, and the present and absent.—In Switzerland census taking was instituted about the middle of the 18th century. In 1860 a law was enacted prescribing a decennial census for the whole federation, and in the same year the first census under the law was taken. The inquiries include sex, age, civil condition, origin, birthplace, domicile, religion, language, physical disabilities, immigration, the distribution of real property, and the number of families and of habitations and other buildings.—Belgium ranks among the first nations of the world in completeness of its national statistics. In 1841 a central commission was established by royal decree. A general census was taken in 1846. In 1856 a new law was passed providing that a general census should be taken every ten years, which should exhibit the actual as well as the legal population. The prescribed inquiries include surnames and Chris-

tian names, sex, age by year and month, birthplace, civil condition, occupation, domicile, and town and country population. In the second census, taken under this law in 1866, comprehensive inquiries into the agricultural, mining, and manufacturing interests of the kingdom were made. Three schedules, printed in the French, German, and Flemish languages, were distributed and collected in one day respectively by special census agents. The statistics of schools and public institutions were taken by means of special schedules. The census of the army was taken by the military authorities. Refusal to furnish information to the census agents was punishable by fine and imprisonment. In 1858 a special census of deaf mutes and blind was taken. The census returns, together with the yearly abstracts from the civil registers, and the results of special inquiries, are prepared for publication by the central statistical commission. A census was taken Dec. 1, 1870.—In the Netherlands the census is taken decennially, the last dating Dec. 31, 1871. It embraces inquiries as to name, sex, age, place of birth, civil state, profession, occupation, or condition, physical disabilities, religion, number of families and habitations. The army and navy, inmates of hospitals, almshouses, prisons, schools, and public institutions generally, are separately enumerated.—The present bureau of statistics in Italy was organized in 1860, with the well known statistician Dr. P. Maestri as chief. Provision was made for decennial censuses, the first of which was taken in 1861, and the latest Dec. 31, 1871. It was taken by municipal and administrative officers, in one day, by means of previously distributed schedules, embracing inquiries designed to show the actual population by age, sex, civil state and domestic relations, families, habitations, nativity, religion, language, physical and mental infirmities, occupation, emigration and immigration, aggregations of population by communes, and aggregations of habitations. The census returns were revised by local commissioners appointed throughout the kingdom, and published in three large volumes under the general direction of the bureau of statistics.—The first general enumeration of the kingdom of Greece was made in 1836. The census was taken annually till 1845, and subsequently in 1848, 1853, 1856, 1861, 1868, and in May, 1870. Prior to 1861 a mere enumeration of the inhabitants was made; since that date the range of inquiries has been greatly extended and more comprehensive official publications have appeared. The movement of the population is determined from civil registers kept by the municipal authorities. Tables of births, deaths, and marriages are published at irregular intervals.—In Turkey the object of the census, which is very imperfect, is to provide the basis for taxation and conscription. A census officer in each province prepares an annual exhibit of the number of births, deaths, absentees and

travellers, public health, movement of real property, taxable values, and losses by fire, disease, &c. An annual statement is prepared by the head of each village of the age, occupation, religion, military service, liability to taxation, &c., of every male inhabitant under his jurisdiction. This statement is transmitted to the comptroller of the census of the province, and by him forwarded after verification to the chief comptroller of statistics in Constantinople.—In France the first census of which the records are extant was taken in 1700, the results of which were published in 1720. During the latter half of the 18th century numerous statistical reports relating to population and other subjects were published by the government as well as by individuals. A general enumeration of the population was made in 1800, and in the following year it was decreed that a national census should be taken every five years. Pursuant to this law censuses were taken in 1806 and 1821; and in 1826 the extent of the population was computed. Since 1826 the census has been taken regularly at quinquennial periods. The last, however, was taken in May, 1872. In 1836 individual schedules were used, in which the age of each person was for the first time recorded. Up to that time only the legal population had been ascertained, but in 1841 the actual population was made the basis of the census. The enumeration has been usually made in May and June. The inquiries embrace surnames and Christian names, sex, age, civil state, birthplace, occupation, religion, degree of instruction, and infirmities of many kinds. At times other subjects of inquiry, such as the proportion of the rural to the town population, diseases, the number of households, inhabited and uninhabited houses, buildings in course of construction, and live stock, have been connected with the census. Statistics relating to population are also derived from other sources. Particulars of births, marriages, and deaths are taken from the civil registers. Reports are prepared of cases of mental aberration, of the inmates of public charitable and penal institutions, of charitable associations, life annuity and insurance companies, savings banks, and public pawn houses. The judicial authorities furnish criminal statistics annually. The reports of population are prepared by the *bureau de la statistique* in the ministry of commerce, agriculture, and public works.—The first census of Great Britain was taken in 1801, and embraced the sex but not the age of all subjects, the number of families, and the occupations, classified so as to exhibit the number employed in agriculture, in trade and manufactures or handicrafts, and those not comprised within these two classes. The first census of Ireland was taken in 1811, but not until recently have the results been received as trustworthy. Dr. Jarvis considers the Irish census of 1841, 1851, and 1861 among the best in the world. In Great Britain and Ireland the census is decennial, and includes the

general statistics of population. For climatic reasons, the month selected is March or April. The most recent census was taken in 1871. The census of Ireland was intrusted to a royal commission, that of Scotland to the registrar general of Scotland. Great Britain was divided into 32,606 districts, to each of which a special enumerator was appointed. Each enumerator had a district of less than two square miles in area, and containing an average of 131 houses and 696 persons. In addition to the 32,606 enumerators, there were 627 superintendent registrars and 2,197 registrars. The police assisted in enumerating the houseless population. The army and the navy were returned by the naval and the military authorities; the merchant seamen by the customs officers and the registrar general of merchant seamen; and British subjects in foreign states and in India, and the population of the colonies, by the secretaries of state for foreign affairs, India, and the colonies. "Householders' schedules," distributed in advance, were required to be filled up on the night of April 2, and were collected by the enumerators the following day. These schedules contained inquiries in regard to the name, relation to head of family, condition, sex, age, occupation, and birthplace of every person in Great Britain; and also as to the number of blind and deaf and dumb. Travellers were enumerated at the hotels and houses at which they arrived, on the following day. At the same time schedules were delivered in the proper quarters for collecting information respecting places of worship, schools, and miscellaneous institutions. In Ireland the census has been taken by the constabulary force. The mode of enumeration is essentially the same as in England. The schedules, however, are more comprehensive, and include inquiries relating to insanity, idiocy, degree of education, school attendance, religion, civil state, when married, birthplace, language, residence, and buildings other than habitations. An agricultural census has been taken in Scotland and Ireland for many years. A cattle census was taken in England for the first time in May, 1866, and was followed soon after by a more comprehensive agricultural census. The movement of the population of the United Kingdom is annually determined by the registrar general's office, through the agency of the district registrars. Besides the registrar general's office, there exists in almost every department of the British government a special statistical service for the preparation and publication of statistical reports upon the various interests of the kingdom.—The origin of the American census may be traced to the colonial period, when the British board of trade caused enumerations of the population to be made at different times, which was done under the immediate direction of the colonial governors, through the agency of the sheriffs and their deputies. These produced, however, little more than approximations to the actual number of the population.

The census of the United States presents the unusual fact of being ordained by the constitution of the government, the first article of which prescribes a general enumeration of the people within three years after the first meeting of congress, and within every subsequent term of ten years thereafter. The immediate object of the census was the apportionment of representatives and direct taxes. The agents employed to ascertain and report the elementary facts are the United States marshals in the several states and territories. The first census was taken in 1790, and recorded the names of heads of families, enumerated the free white males of 16 years and upward, the same under 16, and gave the number of females and the number of slaves. The second and third censuses distinguished the sexes and colors of free persons, classifying the free males under 10 years of age, those from 10 to 16, 16 to 26, 26 to 45, 45 and upward; the slaves were simply taken by number. In 1810 the marshals were directed to make return of the several manufacturing establishments and manufactures within their several districts. A like division was made of population by the fourth census, which distinguished the number of persons engaged in agriculture, commerce, and manufactures respectively. By this census an account of manufactures was returned, and a digest thereof was published in 1823. The enumeration of the fifth census distinguished the sexes of all free white persons, and the ages of white males and females, by periods of 5 years up to the age of 20, thence by periods of 10 years to the age of 100 and upward, specifying the deaf and dumb and blind under the age of 14, those between 14 and 25, and those over that age; the free colored persons and slaves were classified by sex, and the ages under 10, and from 10 to 24, 24 to 36, 36 to 55, 55 to 100, and 100 and upward, distinguishing the colored deaf and dumb and blind without regard to age. The sixth census, taken in 1840, distinguished the whites by sex and by age, as follows: 1, all under 5 years, thence to 10, thence to 15 and 20, thence by tens to 100 and upward, specifying the deaf and dumb, blind, insane, and idiotic; the free colored population and slaves by sexes and ages, first under 10, thence to 24, 36, 55, 100, and those above 100; also the deaf and dumb, blind, insane, and idiotic, without respect to age. In this enumeration the marshals were required to take a census of persons receiving pensions from the United States, with the name and age, and to make returns of mines, agriculture, commerce, manufactures, and schools. In 1850 the scope of inquiry was so greatly enlarged as to make that year an epoch in the growth of the census in this country. For the purpose of preparing adequately for the greatly enlarged work proposed to be undertaken in the enumeration, a census board was established provisionally, consisting of the secretary of state, attorney general, and postmaster general. Upon the disso-

lution of this board the control of the census, which had been previously in the department of state, was transferred to the department of the interior, under the provisions of the act of May 23, 1850, and the office of superintendent of census was created. The census of the United States has continued to be taken under the law of 1850, though this is regarded as very defective. In order to facilitate comparisons, the general forms and moulds of preceding census publications were retained in that of 1870, there being for the first time no return of slaves. But the important improvements made in existing schedules, and the addition of new tables, together with the superintendence of the eminent statistician, Gen. Francis A. Walker, give to the ninth census a completeness of detail and accuracy of result not presented by any previous one; while as a comprehensive exhibit of the social and industrial condition of a people, it surpasses the censuses of all other countries. The constitution contains no requirement for any enumeration of persons outside the several states; but the census law of 1850 makes provision for enumerating the inhabitants of the territories upon the same terms as those of the states; and even prior to the adoption of that law the territories were included in the census. There is no provision for an enumeration of tribal Indians, but the statistics concerning this class of the population in the census of 1870 were obtained by extensive inquiries conducted through the agents of the Indian office. Statistics relating to commerce and navigation and immigration are not within the province of the census, but are reported regularly by the bureau of statistics. In the United States the legal and not the actual population are enumerated. In the census of 1870 the general tables of population give the number of families and dwellings, with the average number of persons to each, the number of white, colored (distinguished as black and mulattoes), Chinese, and Indians, showing the age, sex, and nationality, and whether either or both parents were of foreign birth. The classification of ages adopted for the first time gives the number under one year, by years up to 5, from 5 to 10, 10 to 15, 15 to 18, 18 to 20, 21, 21 to 25, by quinquennial periods from 25 to 80, and by single years from 80 upward; thus exhibiting the number of the school, the military, and the voting age. Dr. Edward Jarvis of Dorchester, Mass., the highest American authority on vital statistics, maintains that the population should be exhibited by states in each year of age, as necessary to determine many anthropological questions, and as having an important agency in the development of political and social science. This is done in many European countries, with valuable results. Another most important feature which appears for the first time in the ninth census is the distinction between native and foreign-born in the tables of age and sex; this will indicate how foreigners,

as distinguished from natives, are affected by the climate and the other conditions of life in the United States. Next to the enumeration of inhabitants, the occupations of the people, as illustrating their industrial and social character, form the most important features of the census. In preparing for the ninth census special attention was given to this class of statistics, which show the number of persons of each sex from 10 to 15 years of age, from 15 to 60, and 60 and over, with nativity, in each occupation, arranged under the general heads of agriculture, professional and personal services, trade and transportation, and manufactures and mining. The tables of school attendance and illiteracy show the total number that attended school, distinguished as native and foreign, together with the white, colored, Chinese, and Indians of each sex; the number over 10 years of age who cannot read, and those unable to write, distinguished as native and foreign, with classifications of color and sex, distinguishing also Indians and Chinese, for three periods of life: 10 to 15, 15 to 21, and 21 and over. Previous tables of illiteracy gave only the number over 21 years of age who could not read and write. The blind, the deaf and dumb, the insane, the idiotic, and those appearing in two, three, or four classes of these unfortunates, are classified by race, place of birth, age, and sex. It was also sought in the census to show, for each month in the year, the number of births, of marriages, and of deaths, thus making the vital statistics of the United States comparable in these particulars with those of many European countries which give the month for the three capital events of life. The returns of marriages, however, were found to be so far imperfect as not to justify publication. In the opinion of Superintendent Walker, the experience of this census, as well as of the censuses of 1850 and 1860, "has shown that the statistics of this subject are only to be collected through a permanent registration, and under a system of penalties." The same authority claims that statistics showing the month of birth for all children born within the census year are of a high degree of value for nine months, as they exhibit with accuracy the varying influence of the seasons upon human reproduction in each section of the country; but in the 10th month, counting backward from the date of enumeration, a very perceptible disturbance is introduced, while in the 11th and 12th months the number of births diminishes with extraordinary rapidity almost to zero. Thus the number of births reported in Massachusetts in May, 1870, was 3,771; in April, 3,430; in March, 3,287; in February, 3,139; in January, 3,117; in December (1869), 3,229; in November, 2,705; in October, 2,899; in September, 2,830; in August, 2,429; in July, 1,584; in June, 567. This significant peculiarity is attributed by Superintendent Walker to the tendency of families to speak of infants of between 11 and 12 months of age, and even between 10 and 11 months, as a year old. Dr.

Jarvis, however, after a most thorough and intelligent examination of the subject, reaches the conclusion that little children were incompletely reported by the ninth census. The mortality statistics are presented by states, and exhibit the various causes of death, and the specified occupations of those having died, with distinction of race, color, sex, and age. The classification of age exhibits the number having died under one year of age, by years up to 5, by quinquennial periods from 5 to 95, and those of 95 and over. The causes of death are distributed into the general classes of unknown, general diseases, local diseases, conditions not necessarily associated with general or local diseases, poisons, parasites, malformations, and accidents and injuries. The proportion of deaths by selected diseases to the total number of deaths, and also to the number of persons living, is given for each state and territory. The scientific direction of the compilation of the tables of mortality was assumed by the surgeon general of the army, and the compilation, in respect to the classification of diseases, and to the periods of time and the sections of territory to be separately presented, was conducted under the supervision of Assistant Surgeon J. J. Woodward, U. S. A. The schools are classified as public, classical, professional, technical, and all other, with the kinds and numbers in each class, together with the teachers and pupils of each sex in each kind, and the school income, distributed into three sources. The statistics of libraries show the total number of all classes, with the number of volumes in each, distinguishing the private from those other than private, the latter being classified as United States, state, and territorial, town, city, &c., court and law, school, college, &c., Sunday school, church, historical, literary, and scientific societies, charitable and penal institutions, benevolent and secret associations, and circulating libraries. Newspapers and periodicals are classified by the various periods of issue, with the number, circulation, and copies annually issued in each class, distinguishing those devoted to advertising, agriculture and horticulture, benevolent and secret societies, commercial and financial, illustrated, literary, and miscellaneous, devoted to nationality, political and religious, sporting, technical, and professional. The number of church organizations, edifices, and sittings, and value of property are given for each denomination. In the tables of wealth, taxation, and public debt are exhibited the assessed and true value of real and personal estate; taxation, classified as state, county, town, city, &c.; and public debt, with the same classification, and the bonded distinguished from all others. Many new and valuable features have been introduced into the agricultural schedules, the most important of which is that showing the total value of farm productions, which removes the difficulty that statisticians have experienced in approximating to a correct total

valuation of the agricultural production of the country. The general statistics of agriculture present by states, territories, and counties the number, size, and value of farms, with the value of farming implements; the acres of improved and unimproved land; the amount of wages paid during the year; the value of orchard, garden, and forest products respectively, of home manufactures, and of animals slaughtered or sold for slaughter; the total value of all live stock, with an enumeration of the kinds; the crops produced, spring and winter wheat being distinguished, dairy products, wax and honey, and sugar and molasses, classified as cane, sorghum, and maple. Selected statistics of agriculture are given for townships where the value of all productions equals or exceeds \$100,000. The statistics illustrating the various manufacturing resources of the country are of exceptional value and interest. The steam and water power of the country employed in manufactures is reported for the first time, as no statistics of this kind had ever been prepared in the United States, except a report for Rhode Island and one for the city of Philadelphia. So also are presented for the first time the number of male and female adults employed, as distinguished from the children and youth, who are likewise enumerated. The general statistics of manufactures indicate the total number of establishments devoted to each industry; the number and horse power of steam engines and water wheels; the number of hands employed, classified as males above 16, females above 15, and youth; the amount of capital invested, and the annual wages paid, together with the value of materials and products. Special statistics exhibit, with a degree of minuteness not before attained, extended information concerning selected industries. Thus, in the tables of cotton manufactures, in addition to the general results mentioned above, and the number and kinds of machines employed, six columns are devoted to the classification of materials, and 20 to products; while in the report of 1860 the classification of materials was limited to two columns, and that of products to four. The statistics of mining show the extent and condition of the leading industries in the United States, and in each state and county; and similar statistics relating to fisheries are presented. Most of the above mentioned statistics are presented for states, territories, and counties, but not for civil divisions less than counties, with the exception of the population tables. But the census report includes tables for 50 principal cities having a population of more than 25,000, showing the area, families and dwellings, with the average number of persons to each, also the number of persons in each class of occupations, with age and sex, and selected nativities. It also contains historical notes respecting the area and political organization of the United States, and its geographical divisions, with descriptions of parcels of territory into which the territory of

the United States has been divided by the successive boundaries of political divisions, and tables showing the parcels of territory composing each political division at specified dates. One of the most important features of the census report of 1870 is the geographical illustration of important subjects by means of maps, which is now introduced for the first time. These maps represent the whole area of the United States; most of them are double, presenting two distinct subjects, generally selected for purposes of direct contrast. The population volume is illustrated with seven maps, which exhibit the density of total population; the distribution severally of the colored and the foreign elements of population; the dispersion over the states of the natives of certain specified foreign countries, viz.: Germany, Ireland, Sweden and Norway, England and Wales, China, and British America; the illiteracy and the wealth of each section in contrast; and the geographical and political divisions of the United States at each period of its existence, from the organization of the government to the latest census year. The volume on vital statistics contains seven maps showing the range, and, within the range, the degree of prevalence of four specific diseases, or groups of diseases, viz.: consumption, typhoid, typhus, and enteric fevers, malarial diseases and dysentery, diarrhœa, and enteritis; also the annual distribution of rain and the courses of the lines of equal temperature, thus affording instruction upon the agricultural capabilities of the country and the conditions of human life in the United States; and a physical chart presenting the most complete and accurate series of elevations yet attained. The five maps illustrative of the volume on industry exhibit the extent of cultivation of five principal crops, cotton, corn, wheat, hay, and tobacco, and also the dairy products of each state and section; also eight principal geological formations of the United States. The results of the ninth census appear in three quarto volumes: I. Population and Social Statistics; II. Vital Statistics; III. Industry and Wealth. A compendium has also been prepared for wide popular distribution, and congress has authorized the preparation and publication of a statistical atlas of the United States, based on the results of the ninth census, to consist of not more than 50 maps, to be compiled by Francis A. Walker, late superintendent. The period contemplated by law for the completion of the enumeration in 1870 was about 100 days; but the enumeration, which was begun June 1, 1870, was not substantially completed till Jan. 9, 1871, and the last returns were not received in Washington till Aug. 23, 1871. The enumeration was made by the 61 United States marshals and 6,572 assistants. The compilation and preparation for the press were performed in Washington under the personal supervision of Superintendent Walker. This work was completed by Nov. 1, 1872; soon after which the first volume was given to the

public, and the remaining two volumes early in 1873. This early publication of the complete results of the census is unprecedented. The total cost of the census, exclusive of printing the results, was about \$3,500,000.—Independent of the federal census, most of the states, either in their constitutions or by act of legislature, have made provision for enumerations of their respective populations. The following statement exhibits the date of the first census in each state, with the interval at which succeeding censuses are to be taken:

STATES.	Date of first State Census.	Subsequent interval, Years.
Alabama.....	1875	10
Arkansas.....	1875	10
California.....	1852, 1865	10
Florida.....	1875	10
Indiana.....	1865	6
Iowa.....	1859*	10
Kansas.....	1865	10
Kentucky.....	1850, 1858	8
Louisiana.....	1875	10
Massachusetts.....	1857, 1865	10
Michigan.....	1854	10
Minnesota.....	1865	10
Mississippi.....	....	10
Missouri.....	1876	10
Nebraska.....	1875	10
Nevada.....	1867, 1875	10
New Jersey.....	1855, 1865	10
New York.....	1855	10
North Carolina.....	1865	10
Oregon.....	1865	10
Pennsylvania.....	1864	7
Rhode Island.....	1865	10
South Carolina.....	1869, 1875	10
Tennessee.....	1871	10
Wisconsin.....	1855	10

In the states not named in the above table, no provision is made for a separate census.—The first census of Brazil was taken in 1872. There was a census taken in the Argentine Republic in 1869, in Colombia in 1870, and in Egypt in 1862. In Abyssinia, Persia, and other eastern nations, there is either no census, or merely a general estimate of the population. In China there has been no census since that of 1812. The extent of the population is ascertained by estimates. The census of 1711 is the first on record that bears the appearance of credibility.—The subject of census systems has in recent years caused much discussion among statisticians and publicists of all countries, with the view of adopting such methods as will make the census of each nation the most comprehensive and accurate exhibit of the social and industrial condition of its people. The importance of such information in promoting the usefulness and happiness of a nation has been fully recognized. International statistical congresses for the consideration of these and kindred questions were held at Brussels in 1853, at Paris in 1855, at Vienna in 1857, at London in 1860, at Berlin in 1863, at Florence in 1867, at the Hague, Netherlands, in 1869, and at St. Petersburg in 1872. In these congresses it was strongly recommended that the

* Required in 1859, 1863, 1865, 1867, 1869, 1875, and every 10 years afterward.

census should be taken by means of prior schedules at least decennially on a single day, at the end of the year, when the smallest number of people are away from home, and should be by names and based upon the principle of the actual population, with data for determining the legal population. Statisticians have agreed that the following inquiries relating to persons are indispensable: name, sex, age with date and year of birth, relation to head of family, civil or conjugal condition, profession or occupation, birthplace, and whether blind or deaf and dumb; and that the inquiries, where practicable and expedient, should also extend to language spoken, religion, residence, whether usual or temporary, children receiving instruction at school or at home, persons of unsound mind in public or private asylums, hospitals, and establishments. "The great object of the census," says Dr. Jarvis, whose study of the census systems of all countries has

placed him in the front rank of authorities on this subject, "is to develop those points that best show the human status, the measure of vitality, the personal, domestic, and social conditions. It is important to make this analysis of nations as minute as possible, to learn as nearly as may be the exact measure of all the elements of force in each individual, and know what and how much he has in himself, and can contribute to the sum total of national power and wealth." In a recent examination of the census of 24 nations and 8 states and provinces, Dr. Jarvis found that no two were alike in their full purposes; only England and Scotland include the same inquiries in their schedules. The following table, prepared by him, exhibits the personal inquiries made by the principal countries of Europe and by the United States at their enumerations, and published in their census reports; several countries not named are counted in the final column:

SUBJECTS OF IN- QUIRY.	Hanover.	Norway.	Sweden.	Russia.	Denmark.	Prussia.	Austria.	Holland.	Belgium.	France.	Switzerland.	Italy.	Spain.	Portugal.	England.	Ireland.	United States.	Massachusetts.	New York.	Canada.	States making this inquiry.
	1864	1865	1866	1863	1860	1864	1862	1859	1856	1861	1860	1861	1860	1864	1861	1861	1870	1865	1865	1861	
Name.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	25
Sex.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	32
Age.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30
Relation to family.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Birthplace.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
Absent.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
Occupation.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	25
Civil condition.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	26
Sick or infirm.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Blind.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
Deaf and dumb.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29
Insane.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Idiot.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
Cretins.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Goutres.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Color.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
Foreigners.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
Parentage.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Convicts.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Education.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
In school.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
Language.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Religion.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
Pauper.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
Am't of real estate.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Voters.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
Voters naturalized.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Family.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
House.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29
House, stories.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
House, material.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5
House, roof.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Married in year.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
Deaths.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
No. of inquiries.....	7	10	11	8	13	14	10	12	10	20	14	19	11	11	13	22	22	22	19	18	....

Of 34 personal inquiries, it will be seen, only one, sex, is made by all. Age is inquired by all except Russia; name is omitted by Russia, Hanover, Baden, and Switzerland; birthplace by Norway, Russia, Prussia, Hanover, and Austria; civil condition by Russia, Baden, and the United States; and occupation by Norway, Russia, and Baden. Families, houses, religion, and the number of the blind and deaf and dumb were noted by nearly all. The United States is the most inquisitive; Ireland, France,

and Italy come next in the order of the minuteness of investigation. In many European countries the enumeration is made in one day. In the United States the system of a protracted enumeration has been adhered to, which in the opinion of eminent statisticians will necessarily give but an approximation to the real number of inhabitants. The liability to error from this cause is comparatively small in rural districts; but in cities and manufacturing towns, where the inhabitants change their

residences more frequently, the percentage of loss becomes very considerable. Superintendent Walker maintains that "if the formation of subdivisions and the confirmation of assistants were vested in the department of the interior, with proper discretion as to the use of special agents, it would be possible to take the census of every city and manufacturing town in the United States in a single day, and to complete the enumeration of all properly agricultural sections in a period not exceeding three days, allowing, if need be, for the completion of the purely mining states and the territories, and perhaps for some portions of Texas, California, Kansas, and Nebraska, a longer period of time, not to exceed 30 days. Such an enumeration could be accomplished in the present condition of the settlement of the United States. It would cost little if any more than a census taken according to the present methods, and would be inexpressibly more satisfactory." The use of "prior schedules" in taking the census has been unanimously recommended by statisticians, not only as effecting a saving of time and expense, but also a higher degree of accuracy in the enumeration. These schedules, containing printed inquiries and directions as to filling up, are distributed among families, and, after having been by them filled up, are collected by the census agents. This plan has been adopted with great advantage by most of the European countries, but has not been introduced into the United States, though its adoption has been urged upon the government by Dr. Jarvis and other high authorities. In the United States, Great Britain and Ireland, Holland, Belgium, Switzerland, Portugal, and Sweden and Norway, the census is decennial; while in Denmark, France, and Austria it is quinquennial. Most of the German nations take their census once in three years.

CENSUS, United States. See supplement.

CENT (Lat. *centum*, a hundred), a United States coin of the value of $\frac{1}{100}$ of a dollar. The act of April 2, 1792, authorized the coinage of a copper cent weighing 264 grains, and a half cent in proportion. The weight of the cent was reduced by the act of Jan. 14, 1793, to 208 grains, and by the act of Jan. 26, 1796, to 168 grains, the half cent being proportionally reduced. The first coinage was executed in 1793. A three-cent coin, three fourths silver and one fourth copper, weighing $12\frac{3}{4}$ grains, was authorized by the act of March 3, 1851, to be a legal tender for any sum not exceeding 30 cents. By the act of March 3, 1853, the fineness of this coin was raised to .900, and its weight reduced to $\frac{3}{8}$ of the half dollar, or $11\frac{1}{2}$ grains. The coinage of the half cent was discontinued by the act of Feb. 21, 1857, and for the old copper cent was substituted a new coin, composed of 88 per cent. copper and 12 per cent. nickel, weighing 72 grains, which continued to be coined until the act of April 22, 1864, provided for the coinage of the bronze cent, consisting of 95 per cent. copper and 5 per cent.

tin and zinc, and weighing 48 grains. The same act authorized the coinage of two-cent pieces weighing 96 grains, and made the one-cent and two-cent coins a legal tender for sums not exceeding 10 cents and 20 cents respectively. A three-cent coin, three fourths copper and one fourth nickel, weighing 30 grains, was authorized by the act of March 3, 1865, which made this coin a legal tender for any sum not exceeding 60 cents. By the same act the one and two-cent coins became each a legal tender to the amount of 4 cents only. The act of May 16, 1866, provided for the coinage of a five-cent piece, three fourths copper and one fourth nickel, weighing 77.16 grains, which was made a legal tender for any sum not exceeding \$1. By the act of Feb. 12, 1873, known as the "coinage act of 1873," the issuing of coins of the denomination of cent, except a five-cent piece and a three-cent piece (three fourths copper and one fourth nickel) weighing 77.16 and 30 grains, and a one-cent piece (95 per cent. copper and 5 per cent. tin and zinc) weighing 48 grains, was discontinued, and the coins authorized by the act were made "a legal tender, at their nominal value, for any amount not exceeding 25 cents in any one payment." Before the adoption of the constitution, cents were coined under the authority of the confederation at New Haven, in 1787, and about the same time cents and half cents were coined by local authorities in Vermont and Massachusetts. The number of coins of each kind produced at the mint from its organization to July 30, 1872, is as follows:

Five-cent pieces...	98,474,000	Two-cent pieces...	45,601,000
Three " (nickel)...	25,701,000	One " "...	477,911,244
" " (silver)...	42,007,490	Half " "...	7,985,223

The total number of pieces is 697,679,957, valued at \$12,686,013 25.—Also, a Canadian copper coin, the multiples of which, pieces of 5, 10, 20, 25, and 50 cents, are of silver, having a fineness of .925. These coins are worth about 5 per cent. less than those of the United States of corresponding denomination. (See COINS.)

CENTAURS, a mythological race of beings, half man and half horse, who were supposed to inhabit the mountains and forests of Thesaly, where they led a wild and savage life. One legend was that Ixion, having been refused all intercourse or fellowship with the human race in consequence of the murder of his father-in-law, Deioneus, was invited by Jupiter to reside on Olympus; but, forgetful of the rules of hospitality, he attempted to seduce Juno, the wife of his entertainer. A cloud woman in the semblance of Juno was substituted in her place, and Ixion boasted that he had triumphed over the queen of all the gods. In punishment therefor he was bound to an ever-revolving wheel in the abyss of Tartarus. From this union between Ixion and the phantom, according to one form of the legend, the centaurs were directly produced. According to others, the offspring of the union was a being

in human shape named Centaurus, who was hated alike by gods and men. Wandering wild over Mount Pelion, he begot the centaurs out of the Magnesian mares. Another story is



The Centaur Chiron and Cupid.

that while Pirithous, one of the Lapithæ, was celebrating his nuptials with Hippodamia, one of the centaurs carried her off. This led to the great fight between the centaurs and the Lapithæ, in which the centaurs were defeated. In early times the centaurs were represented in sculpture as men down to their legs and feet, but having a hind part consisting of the body, tail, and hind legs of a horse. But afterward they were represented as horses, perfect in all respects below and behind the withers and the chest. At the insertion of the neck a human body began, the hip joints articulating into the shoulders of the lower animal, and the abdomen of the man uniting with the chest of the horse. Above this the human conformation was perfect, with the erect bearing, chest, shoulders, arms, neck, and head of a complete man. They were represented as endowed with extraordinary powers of body and mind. Palæphatus, one of the later Greek writers, undertook, in his work *Περὶ Ἀπίστων*, to explain the origin of the myth of the centaurs. According to him, they were a body of young men of a town in Thessaly who first used horses for the purpose of riding. Thus mounted, they pursued the wild bulls, and transfixed them with their spears, and hence were called *κέντρορες*, prickers, or *κεντάυροι*, bull-prickers. The neighboring inhabitants, seeing men mounted on horses, imagined that the man and the animal were one being, just as the Mexicans did in the case of the Spanish cavaliers; and hence originated the fable of beings half man and half horse.

CENTAURUS, or *The Centaur*, a southern constellation, only a small part of which rises in our latitude. Two stars of the first magnitude are catalogued in the portion which does not appear above our horizon. This is one of the

48 ancient constellations formed by Ptolemy, who first discovered the likeness of a centaur in it. On the celestial maps of the Arabs it is represented by a bear mounted on horseback.

CENTAURY, a genus of plants of the family *gentianaceæ*, comprehending a large number of unimportant species, which are natives of Europe, Asia, Africa, and a very few of America. One of the species is fabled to have cured the centaur Chiron of the wound in his foot made by the arrow of Hercules, and to have hence derived its name. It was formerly supposed to have extraordinary medicinal powers, and said to cure not only fevers, but also the



Centaury.

plague, and the worst ulcers; but its properties are only those of a bitter tonic, like those of other members of the same family.

CENTIGRADE SCALE, the 100 parts, named grades or degrees, adopted particularly by the French for the thermometer. It was devised in 1742 by Celsius, professor at Upsal, the limits of the division into 100° being the boiling and freezing points of water, though the scale is made to extend to convenient lengths below and above these points. In Fahrenheit's scale, the freezing point being 32° and the boiling point 212°, 180° include the same range as 100° of the centigrade thermometer. The ratio of one degree of Fahrenheit to one of the centigrade is therefore the same with that of 5 to 9. But as the zero point of the Fahrenheit thermometer is 32° below the freezing point, which is the zero point of the centigrade, this number must be added to the results obtained from the ratio above stated. Thus, if the degree on the Fahrenheit scale which corresponds to 15° centigrade is to be found, 15 must first be multiplied by 9 and the product divided by 5; to 27, the quotient obtained, 32 must be added, and the sum, 59, will be the degree on the Fahrenheit scale required.

CENTIPEDE, an articulated animal, formerly considered an insect, but since the time of Dr. Leach placed in the class *myriapoda*, and in the genus *scolopendra*. This class is distinguished

from insects by the far greater number of feet, by the more numerous segments of the body, and by the absence of any distinct division between the thorax and abdomen. With the exception of the first, each segment has a pair of legs, terminated generally by a single hook; from the occurrence of the stigmata, or respiratory openings, on each alternate segment, Latreille and others, from the analogy of insects proper (which have two stigmata on each segment), have considered these as semi-segments, and have consequently given two pairs of legs to each segment. The feet are much approximated to each other for the whole length of the body; the mandibles are bi-articulated, and followed by a piece formed like a labium with articulated feet-like divisions, corresponding in position to the *lanquette* of crustacea; then come two pairs of little feet, of which the second, hook-shaped often, seem to replace the four jaws of crustaceans, or the two maxillæ and lower lip of insects; they may be regarded as maxillary feet. The antennæ are two, varying greatly in their shape, length, and number of joints. The organs of vision are usually formed by the union of simple eyes, but in some they resemble the compound eyes of insects, with larger facets. All myriapods are wingless. Unlike insects, in this class the number of the rings, and of the feet belonging to them, increases with their age; from the fact that some genera are born without feet, Latreille asserts that they undergo a true metamorphosis, though the separate states of larva, pupa, and imago do not exist in them any more than they do in most apterous insects. The organs of respiration consist of two principal parallel tracheæ along the body, into which the stigmata open. The myriapods seem to approximate somewhat to the crustacea on one hand, and to the insects on the other. They generally avoid the light, concealing themselves under stones, beneath the bark of trees, in old timber, and similar localities; some live in fruits, others destroy vegetables, and many feed on dead and living animal substances. Latreille divides myriapoda into two orders: 1, *chilognatha*, of which the best known genus is *iulus* (Latr.); and 2, *chilopoda*, containing the genus *scolopendra*, which, in the unrestricted latitude given it by Linnæus, included all the genera of the order, all of which have at various times been designated as centipedes or millepedes. In the order *chilopoda* the antennæ are slender toward the extremity, having 14 or more joints; the mouth consists of two mandibles with a palpi-form appendage, terminated like the bowl of a spoon with indented edges; the labium is quadrid, and its two lateral divisions, the largest, are transversely ringed, and resemble the membranous feet of caterpillars; they have besides two palpi or little feet, united at the base and unguiculated at the end, and a second labium formed by a second pair of feet, terminated by a strong movable hook pierced at the end for the issue of an acrid liquid.

The body is membranous and flattened, each ring being covered by a coriaceous plate, and having for the most part but one pair of feet, the terminal segment being elongated into a kind of tail; the sexual organs are interior, and placed at the posterior extremity of the body.—The centipedes move very rapidly in an undulating manner; they can walk backward, using only the four hind legs, which in ordinary progression are dragged after them. They are carnivorous, and are much dreaded by the inhabitants of warm climates, where they attain a large size, and are capable of inflicting dangerous wounds; it is said that their bite, though more painful than that of the scorpion, is never fatal; the common species of Europe (*lithobius forficatus*, Linn.), very abundant under stones in the summer season, is quite harmless, though repulsive in its aspect. The genus *scutigera* (Lam.) has the body covered with 8 plates, 15 pairs of legs, and large reticulated eyes; they are nocturnal in their habits, and pierce their insect prey with their mouth-hooks, producing almost instant death; according to Illiger, they are dreaded by the inhabitants of Hungary. The genus *scolopendra*



Scolopendra morsitans.

(Leach) has 21 pairs of legs, of which the basal joints of the terminal legs are armed with spines; the segments are nearly of equal size and number above and below. The *S. cingulata* (Latr.) of southern Europe is almost as large as some of the species of tropical America. Several species of South America and the West Indies have doubtless been confounded under the *S. morsitans* (Linn.), one of which grows to the length of a foot; very large species also occur in Asia, Africa, and the Indian archipelago. Ammonia is the best application to their bites. Of the genus *erytops*, Dr. Leach mentions two species found in the vicinity of London; the eyes are very small, the antennæ are grained, and the basal joint of the more slender hind feet is without spines. In the genus *geophilus* (Leach), the antennæ have only 14 joints, but the legs vary in number from 42 to nearly 300; they are very slender, and some are phosphorescent; they are destructive to fruit and vegetables.—The position of the myriapoda can hardly be said to be determined. Siebold says they do not properly belong either to *arachnida* or *insecta*, and he classes them under *crustacea*. Rymer Jones observes that they differ from crustacea

by their respiring air by means of tracheæ, and from annelids by their jointed legs, and that they seem to be an osculant group, allied to annelids, insects, arachnida, and crustacea; they have urinary organs like insects, which crustacea have not. Prof. Agassiz makes them the lowest order of the class of insects, the other orders being arachnids and insects proper. Newport traces the nervous system from the highest *chilognatha*, the most perfect of which are connected on the one hand with crustacea and on the other with true insects, through the *geophili* (the lowest vermiform type of the *chilopoda*), to the tailed arachnida (the scorpion), and through *scelopendra*, *lithobius*, and *scutigera*, the last of which connects the myriapoda on the one hand with true insects, and on the other with arachnida. The heart or dorsal vessel, as in insects and arachnida, is divided into several compartments, corresponding in number to the abdominal segments.

CENTLIVRE, Susanna, an English dramatic writer, born in 1667, died in London, Dec. 1, 1723. She was daughter of a Lincolnshire gentleman named Freeman. Left an orphan at the age of 13, and ill-used by those who had charge of her, she fled to London. At the age of 16 she was married to a nephew of Sir Stephen Fox. A year afterward she was a widow; but her wit and beauty soon brought her another husband, an officer in the army, named Carrol. A year and a half after this second marriage her husband was killed in a duel, and she was obliged to depend upon her pen for support. Under the name of Carrol she published some poetry and a tragedy, "The Perjured Husband." She attempted but one more serious drama, but wrote several successful comedies, some of them before she was 19 years old. She also performed on the stage for a brief period, and in 1706, while she was playing in Lee's "Rival Queens" before the court at Windsor, she won the heart of Joseph Centlivre, principal cook to Queen Anne, and married him. She was intimate with Steele, Sewell, Rowe, Farquhar, and other men of note, and incurred the enmity of Pope, who exhibited his malice toward her in the earlier editions of the "Dunciad." She wrote 19 plays, all of them noted for the ingenuity of the plots and the vivacity of the dialogue; but only three of them have kept the stage, "The Busy-Body," "A Bold Stroke for a Husband," and "The Wonder, a Woman Keeps a Secret." Her works, with a biography, were published in 1761 (3 vols. 12mo, London), and a facsimile edition was published in 1872.

CENTO (Latin, patchwork), a poem composed wholly of verses taken from one or more poets, and disposed in a new order so as to form a distinct work. The only classical example is the *Cento Nuptialis* of Ausonius, formed out of Virgilian verses perverted into a new meaning. The empress Eudocia wrote the life of Jesus Christ in Homeric centos;

Proba Falconia, under the emperor Honorius, wrote the same in verses extracted from Virgil. The same subject was treated in a Virgilian cento by Alexander Ross, a Scotch schoolmaster and poet, in his *Virgilius Evangelizans*, which was republished in 1769. The term cento is also applied to a medley, or a work composed of selections connected by appropriate passages.

CENTRAL AMERICA, the narrow, tortuous strip of territory connecting North and South America, extending from about lat. 7° to 18° N., in length from 800 to 900 m., and varying in breadth from about 80 to about 300 m. It comprises five independent republics, Costa Rica, Guatemala, Honduras, Nicaragua, and San Salvador, with a united area of 175,000 sq. m., and a total population of 2,665,000. Throughout its entire length the country is traversed by a chain of mountains consisting of three groups: the Costa Rica, which traverses the republic of that name and the isthmus of Panama, the Honduras and Nicaragua, and the Guatemala, with peaks from 3,000 to 11,000 ft. in height. The volcanoes Fuego and Agua are 13,000 or 14,000 ft. high. The inequality of the surface produces great variety in the climate and vegetable productions, the country producing the fruits and grains of Europe and America, and sugar cane, indigo, cochineal, tobacco, cotton, and all the fruits of the tropics. The zoology is similar to that of other American countries; but Central America is remarkable for the variety and beauty of its humming birds, macaws, and the quezal, which has a brilliant plumage of emerald green. Large and dangerous serpents are numerous, and the country is infested with two species of locusts, one of which is particularly destructive. The rivers and bayous abound in fish. The geology exhibits granite, gneiss, and mica slate as substrata, with an abundance of igneous rocks showing volcanic action. There are gold, silver, iron, lead, and mercury deposits, and the gold, silver, and iron mines are worked to some extent. Much salt is obtained both from springs and from the sea on the Pacific side. The people are divided into three classes, whites and creoles, mestizos, or the offspring of whites and Indians, and the aboriginal natives. The commerce is insignificant. The interest of the country centres mainly in its two or three practicable routes for interoceanic canals between the Atlantic and Pacific.—In 1502 Columbus visited the east coast; in 1523 Cortes sent Pedro Alvarado to subdue the country, and in 1525 he completed the conquest. It remained subject to Spain till 1821. In 1823 the colonies formed themselves into a federal republic of independent states; this arrangement continued till 1839, when the federation was dissolved. Subsequent unions were effected and dissolved; and representatives of the five states met at La Union, San Salvador, Feb. 17, 1872, to consider the formation of a new confederation, but without result.

CENTRAL CITY, a town and the capital of Gilpin co., Colorado, situated partly in the valley of a tributary of North Clear creek and partly on the slopes of the surrounding mountains, 39 m. W. of Denver; pop. in 1870, 2,360. It is irregularly but substantially built. Its site is 8,300 ft. above the level of the sea. The streets are narrow, and some of them steep and rugged. Being in the centre of an exceedingly rich gold-mining region, it is at once a depot of supply and a point of shipment. The bullion shipped in 1870 amounted to \$1,650,000. The town has a United States land office and an assay office. There are two hotels, a miners' and mechanics' institute with a library of about 1,000 volumes, and Catholic, Methodist, and Episcopal churches, with the last of which is connected a parish school. The high school building is of stone, and cost \$20,000. St. James library association has about 500 volumes. A daily and two weekly newspapers are published. There are a number of quartz mills, and a national bank with a capital of \$50,000.

CENTRAL HEAT. Since the year 1740, when the first observations respecting the increase of heat encountered with the increased depth below the surface were made by M. Gensanne in the lead mines of Giromagny in S. Alsace, abundant data have been collected by scientific men in various parts of the world in support of the theory that the interior of the earth is intensely hot. The deepest mines of Mexico, England, France, Germany, and other countries, and the deeper artesian wells, and the hot springs ascending from still deeper sources, all lead to this conclusion. The volcanic fires add their testimony to the existence of intensely heated masses beneath the crust of the earth, and the vast extent of surface agitated when they are suppressed, and relieved by their outlet, seems to indicate an almost general diffusion of the liquid molten masses from which they spring. Not only is the heat found generally to increase with the depth, but the rate of this increase has in many instances been determined. It is found to vary in different countries, in some increasing two or three times more rapidly than in others. The average rate is estimated by Kupffer at 1° F. for every 37 English feet; and by Cordier at 1° for every 45 feet. These phenomena, all pointing in one direction, have led to the conclusion that somewhere in the interior the materials of the globe must be in a state of the most intense heat; and calculations have been made showing at what depth the rocks must all exist as liquid lava, at what the temperature of melted iron would be found, at what platinum would fuse, and at what various matters, solid at the surface, would be volatilized, but for the enormous pressure. This theory is controverted by Sir Charles Lyell, M. Poisson, and other eminent authorities, on these grounds: When substances, as metals, are melted, their temperature cannot be raised a single degree above the

point of fusion so long as a piece of the material remains unmelted. The same principle is exemplified in the impossibility of raising water to a higher temperature than 32° F. so long as a fragment of ice remains in it. The principle may be applied to the solid crust of the earth, which could no more remain unchanged, reposing upon the surface of a fluid heated many times above the temperature at which its materials would melt, than a stratum of ice of the same thickness could remain in the same situation exposed to the same proportional difference of heat. The crust that forms upon lava as it cools cannot be instanced in disproof of this statement, for this only forms when the heat is so much reduced that ebullition has entirely ceased; if this be renewed, the crust soon disappears in the fluid. Were the crust of the globe the result of partial cooling from a state of primitive fluidity, the whole planet must first have cooled down to about the temperature of incipient fusion, and hence the enormous degrees of heat supposed cannot exist within it. M. Poisson "imagines that if the globe ever passed from a liquid to a solid state by radiation of heat, the central nucleus must have begun to cool and consolidate first." Were the central portion fluid, tides would be perceived in the mass, sufficient to cause the surface to rise and fall every six hours; but no such fluctuations are observed, even in a crater like that of Stromboli, which is supposed to connect with the great central ocean of lava. The phenomena that have given rise to the hypothesis of central heat do not absolutely require this theory to account for them. Local heat is without question generated by chemical changes taking place among the materials beneath the surface. These give rise to electrical currents, of the power of which to disturb the surface we can form little idea; but judging from their effects upon the limited scale on which they come under our observation, it would seem quite as philosophical to refer to them the phenomena connecting distant volcanic outbreaks and earthquakes, as to call in an aid so hypothetical as that of the molten fluidity of the central portion of the globe.

CENTRAL PROVINCES, one of the eight large administrative departments into which British India was in 1872 divided, situated between lat. 18° and 24° N., and lon. 77° and 83° E. They were formed into a chief commissioner-ship by royal decree of Nov. 2, 1861. At first they consisted of the province of Nagpore and its dependencies, and the districts of Saugor and Nerbudda; were enlarged in 1862 by the annexation of Sumbulpore and its dependencies; and in 1872 contained an area of 112,561 sq. m., of which 84,162 were immediate British possessions, while the remainder belonged to 15 native states. According to an official report presented to parliament in 1870 ("Statement exhibiting the Moral and Material Progress of India during the years 1868 and 1869," London, 1871), the population of the British

possessions was 9,068,103, and that of the native states about 1,100,000. In 1866 there were in the provinces, according to an official enumeration, 6,064,770 Hindoos, 1,995,663 Gonds and aboriginal tribes, 237,962 Mussulmans, and 6,026 Europeans. Of the inhabitants 57 per cent. were engaged in agriculture. The British portion is divided into four commissionerships (Nagpore, Jubbulpore, Nerbudda, and Chutteesgurh) and 19 districts. The line of railroad which connects Calcutta and Bombay passes through these provinces, and has greatly contributed to their rapid progress. Numerous roads have of late been made, the number of schools has more than doubled since the organization of the chief commissionership, and the capital, Jubbulpore, has now a larger traffic passing through it than any other city of India except Bombay. The chief product is cotton, of which 653,517 lbs. were exported in 1868. The revenue of the Central Provinces amounted in 1870-'71 to £1,130,000, and the expenditures to £865,228. The largest cities are Nagpore, Jubbulpore, and Saugor.

CENTRE, a central county of Pennsylvania; area, about 1,000 sq. m.; pop. in 1870, 34,418. It is traversed by the Alleghany, Bald Eagle, and several other mountain ranges. It is drained by a number of small creeks, which supply several mills and factories with water power. The soil is excellent in the valleys, and agriculture is in a forward state. The mountains are covered with valuable timber, but furnish little land suitable for cultivation. There are extensive mines of iron, quarries of limestone, and beds of stone coal in several places. The Clearfield division of the Pennsylvania Central railroad intersects the S. W. corner, and the Bald Eagle division traverses the county. The chief productions in 1870 were 479,145 bushels of wheat, 63,108 of rye, 1,044,760 of Indian corn, 389,628 of oats, 37,256 of barley, 117,403 of potatoes, 27,725 tons of hay, 521,090 lbs. of butter, and 53,448 of wool. There were 6,588 horses, 6,484 milch cows, 9,489 other cattle, 18,017 sheep, and 15,573 swine. There were 22 flour mills, 23 manufacturing of iron, 1 of window glass, 15 tanneries, 4 planing mills, 25 saw mills, 5 manufacturing of agricultural implements, 28 of carriages and wagons, 2 of edge tools, 1 of machinery, 1 of wire, and 4 of woollen goods. Capital, Bellefonte.

CEOS. See ZEA.

CEPHALONIA, or *Cephalenia*, called by Homer Same or Samos, the largest of the Ionian islands, separated from Ithaca on the E. by a narrow channel. It is now one of the 13 nomarchies of the kingdom of Greece; area, about 300 sq. m.; pop. in 1871, 77,382. The country is rugged and mountainous, particularly in the N. part, and the Black mountain (anc. Mount Enos) constitutes the most picturesque feature of Cephalonia. The climate is usually mild. The soil produces little corn, but some wine, oil, honey, and all the

fruits of southern Europe. Currants, the staple product of the Ionian islands, come chiefly from Cephalonia. In 1870, the exports of Cephalonia currants were 17,746,400 lbs., valued at \$498,318, besides 2,690,240 lbs. of Morea currants. The total exports were \$857,928; imports, \$1,447,219. The harbor of Argostoli is excellent, and ship building and various other branches of trade and industry are carried on actively. The imports consist mainly of breadstuffs and of the manufactures and wares of Europe. The Greek church is the predominant religion, the remainder belonging to the Roman Catholic church. Property is much more divided in Cephalonia than in other parts of the Ionian islands. About one sixth of the cultivated land belongs to the convents, of which there are more than 20, and many of them, as for instance the convent of Sisi, are very ancient.—The island is supposed to have been originally inhabited by Taphians, and to have derived its name from the mythical Cephalus. There were four cities in Cephalonia in the times of antiquity, viz., Pale, Crani, Proni, and Same. The site of Proni, and still more that of Same, still exhibit extensive and interesting ruins. The latter city, which was more populous than the other three, is frequently mentioned by Homer, while the inhabitants are spoken of by the poet as the Cephallenians. Thucydides called the island a tetrapolis (composed of four states), and still other names were applied to it. But the name of Cephalonia first occurs in Herodotus. The island belonged successively to the Greeks, the Macedonians, the Romans, the Byzantine emperors, the Normans, the Venetians, the Turks, and the French. From 1815 to 1863 it was with the rest of the seven Ionian islands under the protection of Great Britain. In August, 1849, an insurrection broke out in the island, which could only be suppressed by the most energetic measures on the part of the British governor. Cephalonia is represented in the parliament of Greece by ten deputies. Capital, Argostoli.

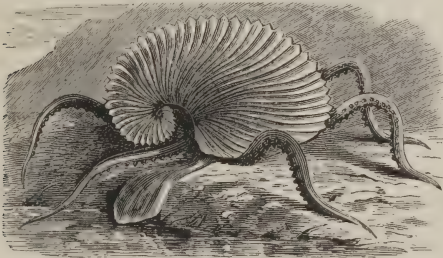
CEPHALOPODA (Gr. *κεφαλή*, head, and *πόδι*, foot), the highest of the branch of mollusks. Some have no external shell, like the squid (*Loligo*); others an internal one, like the cuttle fish (*Sepia*); others a simple shell, like the argonaut; and others chambered shells, like the fossil ammonites and living nautilus, many being in this respect unsurpassed for symmetry and beauty among mollusks. Their most striking feature is that the head is distinct from the body, with large eyes on the sides; the posterior part of the body ends in a sac. The principal locomotive organs, whence their name, are attached to the head in the form of muscular arms or tentacles, usually eight or ten; besides these, many have fins, and all are more or less able to propel themselves backward by the forcible expulsion of water from the branchial sac through the siphon which opens on the lower surface. They are perfectly symmetrical animals, having the right and left sides

equally developed, and the shell, when present, usually straight or coiled in a vertical plane, very different from that of the spirally coiled gasteropods. The cephalopods, except the argonaut, do not occupy the whole of their shells, as do the gasteropods, but have a shell of chambers, numerous according to age, the animal dwelling in the anterior one and forming another one, with a dividing partition, as it grows larger. They are carnivorous, with powerful parrot-like jaws, moving vertically; the tongue is in part armed with recurved spines for retaining the food; all their senses



Argonaut without the Shell.

are acute; they are all marine. The nervous system is more concentrated than in other mollusks, and the anterior ganglia, or brain, are protected by a cranial cartilage, which has been regarded as a commencing cranial cavity. They breathe by two or four plume-like gills, symmetrical on each side, in a cavity beneath the body, opening externally; at the base of the gills are dilatations of the blood vessels, which send the blood to the heart after purification. The sexes are distinct, but the females are the most numerous, the males of many being un-



Argonaut with the Shell.

known, and some, the so-called *hectocotyli*, resemble a detached arm of the animal, modified for sexual purposes. All the living cephalopods, except the nautilus, belong to the dibranchiate or two-gilled order; these are naked, free swimming animals, with distinct head, prominent eyes, eight or ten arms with numerous suckers, the body round or elongated, usually with two fins; all have an ink gland, and the walls of the funnel entire; with the exception of the argonaut, the shell, when present, is internal. These are the typical cephalopods, and higher than the tetrabranchiate or

four-gilled, creeping, many-armed shell-bearing nautilus and ammonites. Having ordinarily no external shell for defence, they have powerful arms provided with suckers, a gland for secreting an inky fluid to discolor the water, and acute senses and rapid movements. The *acetabula* or suckers are in single or double rows on the inner surface of the arms; the muscles of each cup converge to a central cavity, with a soft piston-like caruncle in the centre, by which a very strong adhesion is effected; these are perfectly under the control of the animal, which can instantly release its thousand suckers, and dart away under cover of its inky secretion, at the approach of danger; in some the base of the piston forms a toothed horny loop, or even a sharp hook. The ink bag is tough and fibrous, discharging its contents near the base of the funnel; the ink was formerly used as a pigment, and it is so indestructible as to be found fossil, and to permit the naturalist to draw with its own secretion an animal which perished millions of years ago. The skin is of various colors, and remarkable for the sudden changes which dart over it in brilliant flashes as the creature dies; they have hence been called "chameleons of the sea;" they have water pores on the head and arms. They are nocturnal or crepuscular animals, hiding by day, found in every zone and at all depths of water, as well as in the open sea; they may attain, in tropical seas, a length of six or eight feet, including the arms, and a weight of 300 lbs. The dibranchiate cephalopods have been divided into the octopods, with eight arms, like the octopus and the argonaut, and the decapods, with ten arms and more elongated body, like the squids, cuttlefishes, and fossil belemnites. The tetrabranchiate cephalopods are protected by shells, attached to the body, in the anterior chamber of which the creature dwells. They are now nearly extinct, the nautilus being the only living representative. More than 1,400 fossil species are known by their shells, which vary from perfectly straight in *orthoceras* and *baculites* to the tightly coiled ammonite and nautilus; they performed in the palaeozoic and mesozoic seas what the carnivorous gasteropods did in the cenozoic and do in the present epoch. The chambers do not act to enable them to rise or sink at will; they are rarely found at the surface of the water, except in storms, but belong at the bottom, where they creep like a snail; the discoidal forms were not well calculated for swimming by their respiratory jets, and the straight ones, from the buoyancy of their shells, must have remained head downward. The use of the chambers is generally believed to be to render the animal of nearly the specific gravity of water, and thus facilitate locomotion, and that of the partitions to strengthen them against collisions, being most numerous in the delicate ammonites; the animal is probably always growing forward, except during the formation of the partitions,

which indicate periods of rest. All the cephalopods below the middle of the mesozoic strata belong to the group with chambered shells; those with internal shells do not date back much beyond the oolite age, like the belemnites; the group with chambered shells may, therefore, be regarded as the lower type. Those which have eight arms have never any shell or hard part; those which have ten have always hard parts, varying from cartilage to the horny pen of the squids, and the calcareous plates of the cuttle fishes.

CEPHALUS, in Greek mythology, son of Deion and Diomedes, and husband of Procris, whom he tenderly loved. Aurora was enamored of him, and prompted him to tempt the fidelity of his wife. Disguised he came with presents to his house, and Procris fell. She subsequently seduced him, and the discovery of their mutual weakness led to a reconciliation between them. Cephalus afterward slew his wife with his spear, mistaking her for a wild animal, as she was jealously watching him in the wood. According to Ovid, Cephalus finally gave his name to Cephalaria.

CEPHISSUS, the name of two rivers in Greece, one rising in the western part of Phocis, flowing S. E., and emptying into Lake Topolias (Copaïs); the other the principal river of the Athenian plain, having its main source at Trinemii, between Mts. Pentelicus and Parnes, and running S. on the W. side of Athens. Formerly its outlet was in the bay of Phalerum; but so much of the water as is not exhausted in irrigation now empties through the long walls, or tunnels, at Port Piræus. In ancient Greece two other rivers were called Cephiessus.

CERACCHI, Giuseppe, an Italian sculptor, born in Corsica about 1760, executed in Paris, Jan. 30, 1801. He took an active part in the establishment of the ephemeral republic of Corsica in 1798, and in 1799 sought refuge in Paris, where he joined a band of republican artists, who cherished a violent hatred against Napoleon, and at length made an attempt upon his life. The murder was to be committed Oct. 10, 1800, at the opera; but the conspirators were betrayed by one of their number, their weapons seized, and Ceracchi with his associates Diana, Aréna, Topino-Lebrun, and Demerville arrested, tried, condemned, and all but Diana executed.

CERAM, Celram, Sirang, or Zeram, one of the Molucca islands, in the Malay archipelago, lying N. of Amboyna, between Booroo on the west and Papua on the east; lat. $2^{\circ} 47'$ to $3^{\circ} 50'$ S.; lon. $127^{\circ} 51'$ to $130^{\circ} 56'$ E.; area estimated at 6,500 sq. m.; pop. at 67,000. Its topography is imperfectly known, but the general character of the surface is hilly, several mountain ranges, from 5,000 to 6,000 ft. high, traversing the island, and giving rise to a number of streams which empty principally off the S. coast. The loftiest peak is that of Noosaheli, 7,000 ft. above the sea. The climate is salubrious, vegetation is luxuriant, and the nutmeg

and clove were produced spontaneously until extirpated by the Dutch about 1657. The sago palm here reaches the height of 100 ft., and a single tree sometimes yields 1,200 lbs. of starch. Many varieties of forest trees are found, furnishing fine woods for cabinet work, known in commerce as Amboyna wood, but none suitable for ship building. The coasts are peopled by a hardy, enterprising Malay race, who subsist chiefly by fishing, and find a market for the produce of their toil at Singapore and the Sunda islands; they also have an extensive trade with China in tripang. Their vessels, called *praus* or *kora-kora*, are manned by from 30 to 60 rowers each. Most of these people are Mohammedans, but Christian missionaries have made many converts among them. The Alfuros are the dominant tribe of the interior. They are described as an honest and in most respects peaceable race of idolaters, among whom Christianity has made some progress. A little maize, for domestic consumption or exchange for dress, firearms, and fermented liquors, is cultivated, chiefly by women; while the men are engaged in hunting. The Alfuros have prominent features, large eyes, and long frizzled hair; they are brave, faithful, obedient, and make good soldiers. In the mountains in the central part there is now but one populous village; in the east and extreme west there are a few others; but with these exceptions the inhabitants are generally on the coast. On the S. W. coast the Dutch have improved the condition of the natives by establishing schools in every village, introducing vaccination, and encouraging settlement by Europeans. New cacao and coffee plantations, affording work at fair wages, have elevated the condition of the natives. The Dutch have the sovereignty of the island, and have established several forts on it. On the N. E. coast are the bay and village of Waroo, where good anchorage, water, and provisions may be had. Off the coast of Ceram lies a small group of islands called Ceram Laut.

CERAUNIAN MOUNTAINS (Gr. τὰ Κεραύνια ὄρη, the thunder-riven mountains), a name given by the ancient Greeks to two different ranges. **I.** One belonging to the eastern extremity of the great range of Caucasus, the precise position of which is not certainly known. Strabo makes it the name of that portion of the Caucasus which overhangs the Caspian sea, and in which he places the land of the Amazons. Mela seems to apply the name to the whole chain of the Caucasus, and Pliny gives a similarly extensive signification to it. The name in fact appears to have been used at first in conjunction with Caucasus for the highest summit of the range, and afterward applied confusedly to the eastern portion of the mountains, which were very imperfectly known to the ancients. **II.** Lofty and rugged mountains in the N. part of Epirus, said to have derived their name from the thunder storms which were very frequent among them. They are often called Acroce-

raunian from the name of their terminal promontory, which runs out into the Ionian sea, and is now called Glossa, or by the Italians Linguetta. The Ceraunian mountains extended several miles along the coast from the Acroceraunian promontory, and were much dreaded by sailors from the storms they produced. Inland they were connected by an eastern branch with the mountains on the northern frontier of Thessaly. The inhabitants of the mountains were called Ceraunii. These mountains were famous in ancient poetry, and among the modern poets Shelley has celebrated them. Their present name is Khimara.

CERBERUS, in Greek mythology, the monster that guarded the entrance to the infernal regions. He was a son of Typhon and Echidna, and is represented as a dog with three heads, the tail of a serpent, and a mane composed of the anterior extremities of numberless snakes. His business was to admit the spirits of the dead into their subterranean abode, and to



Cerberus.

prevent them from leaving it. Orpheus lulled him to sleep with his lyre, and Hercules dragged him from Hades, and exhibited him to the eyes of wondering mortals.

CERDONIANS, ancient heretics, whose belief, half philosophical, half religious, was a confused mixture of Christian dogmas with oriental dualism and Gnostic ideas. Their founder, Cerdo, was a Syrian, who came to Rome about the year 139, under the pontificate of Hyginus, and developed a system, involving the two principles of good and evil and a demiurge, similar to, if not identical with, that of his contemporary Marcion. (See *GNOSTICS*.) His disciples became confounded with those of the latter.

CÉRÉ, Jean Nicolas, a French botanist, born in the Isle of France in 1737, died there, May 2, 1810. Under the direction of the French government he greatly extended the culture of spices in the Isle of France (now Mauritius). The agricultural society of Paris published his essay on the culture of rice, and awarded him

a medal; and Napoleon confirmed him in his position as director of the botanical garden of the Isle of France, and conferred on him a pension of 600 francs. A tree of the island has been called after him *Cerea*.

CERREALIA, a festival celebrated at Rome every April in honor of Ceres, if the citizens were not in mourning for some public calamity. If they were, its celebration was omitted, because no person wearing mourning could be present at it. On the occasion of this festival the wanderings of the goddess in search of her daughter were represented by women dressed in white, running about with lighted torches; and games were celebrated in the circus maximus, the spectators of which appeared in white.

CEREBRO-SPINAL MENINGITIS. See *SPINAL DISEASES*.

CERES (called by the Greeks Demeter), the goddess of grain and harvest among the Greeks and Romans, daughter of Saturn and Rhea, and mother of Proserpine. She dwelt on Olympus till after the abduction of her daughter Proserpine by Pluto with the connivance of Jupiter. Ceres in her anger then abandoned the abode of the gods, and descended to earth to wander among men. On all who received her kindly she conferred presents and blessings; but on those who treated her inhospitably, or slighted her gifts, she inflicted severe punishments. In her grief she took neither nectar nor ambrosia, nor attended to her person; and instead of exhibiting her celestial charms, she went in the guise of an old woman. In the course of her wanderings she came at length to Eleusis, where she was hospitably received by its king, Celeus, whose wife Metanira engaged Ceres to nurse her infant son Demophon. Under the care of the goddess the child thrived like a celestial. As he lay on her bosom, Ceres breathed on him, and anointed him with ambrosia; and every night, ere she put him to rest, she immersed him in the fire unknown to his parents. Ceres proposed to make the child immortal, but the folly of his mother frustrated her intention. Metanira, wondering at the marvellous growth of her son, became curious to know how his nurse treated him. Watching one night, therefore, she saw with terror and astonishment the ordeal through which her child was made to pass, and she shrieked aloud at the sight. The goddess instantly dropped the infant, and he perished in the flames; but to make up for the loss, she bestowed great favors upon Triptolemus, the other son of Celeus. Ceres then cast off her disguise, and appeared in her real character, commanding the people of Eleusis to build her an altar and a temple. A temple was raised in the vicinity, in which the sorrowing Ceres took up her abode. In the mean time the indignation of the divine mother had visited the earth with a famine. Jupiter therefore sent Iris to Eleusis to entreat Ceres to suffer the earth once more to bring forth her fruits, and to endeavor to prevail on her to return to Olympus; but with

neither request would she comply, save on condition that her daughter Proserpine should be first restored to her. All the other divinities of Olympus were successively sent to her on the same mission, but in vain. Jupiter, finding at length that it was impossible to shake her determination, sent Mercury to Erebus to beg of Pluto that he would permit Proserpine to return to the earth on a visit to her mother. The king of Hades at once complied with the request, but while announcing to his consort that she was at liberty to return to her parent, he cunningly handed her a pomegranate seed, which she incautiously swallowed. Proserpine was then conducted by Mercury to Eleusis, and delivered to Ceres. After the first burst of joy at this unexpected meeting had found vent, Ceres asked Proserpine if she had tasted aught in the nether world, to which the latter replied that she had—a single pomegranate seed. Then, said the mother, you must spend one third of every future year in the regions of darkness with your husband, but the other two thirds you will be privileged to pass on earth with me. The wrath of the goddess was now appeased, and she caused the earth to yield fruits in abundance as of old; she instructed the Eleusinian sovereign and his nobles in the mysteries of her worship; and when Jupiter sent Rhea to invite her once more to Olympus, she cordially accepted the invitation, and went thither with her daughter to take up her abode again among the immortals.—The chief seats of the worship of Ceres, besides Rome, were Attica, Arcadia, and Sicily, where she was

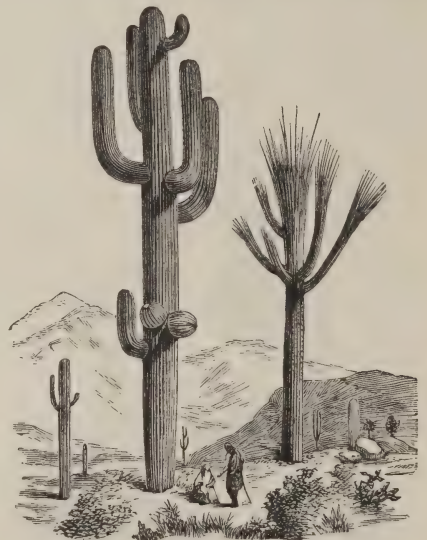


Ceres.

adored under the name of Demeter. The principal sacrifices offered on her altars were swine, the symbols of fertility, oxen, cows, honey, cakes, and fruits. Her image resembled

that of Juno in its maternal character, but expressed more mildness and dignity. She was represented sometimes in a sitting attitude, sometimes walking, and sometimes riding in a chariot drawn by horses or dragons. Her attire was always complete, and on her head she generally wore a garland of corn or a band of ribbon; while in her hand she held a sceptre, a bunch of corn, or a head of poppy, and occasionally a torch or mystic basket. The principal festivals of the goddess were the Thesmophoria and Eleusinia in Greece, and the Cerealia at Rome.

CEREUS, the name given to several species of cactus. The largest and most remarkable is the *cereus giganteus*, called by the Mexicans

*Cereus giganteus.*

saguaro, found chiefly in New Mexico and Texas, between lat. 30° and 35° N. It grows from a globular form to a tall, upright, remarkably regular cylinder, which sometimes throws out branches which at a short distance from the trunk turn and grow parallel with it. The old plants often attain a height of 60 ft. They bear a light cream-colored flower, and a fruit with a green rind and crimson pulp, pleasant to the taste.—For the night-blooming cereus (*cactus grandiflorus*), see **CACTUS**.

CERIGNOLA, a town of Italy, in the province and 22 m. S. E. of the city of Foggia; pop. about 18,000. The inhabitants are engaged in the cultivation of almonds and cotton, and also in linen manufactures. It has a college, hospital, and several convents. On April 28, 1503, the Spaniards, commanded by Gonzalvo de Cordova, here defeated the French under the duke of Nemours, who lost his life in the battle. In the principal streets of Cerignola is a *milliarium* recording that Trajan laid out the road from Beneventum to Brundisium at his own cost.

CERIGO (anc. *Cythera*), the southernmost of the Ionian islands, now an eparchy of the kingdom of Greece, situated at the E. entrance of the Laconian gulf, between lat. $36^{\circ} 7'$ and $36^{\circ} 22' N.$, and traversed nearly through its centre by the meridian of $23^{\circ} E.$ Its length from N. to S. is nearly 20 m., and its greatest breadth about 12; area, 106 sq. m.; pop. in 1871, 10,637. The shores are abrupt and dangerous to shipping. Storms are frequent, the currents round the island being from its peculiar position very strong, and the air is rarely quite calm. It is hilly, and abounds with streams. The soil is generally fertile; the products are corn, currants, wine, olive oil, and honey; cattle, goats, and sheep are reared. Many of the peasants resort annually to the Morea and to Asia Minor to work there during harvest time. It contains two curious natural caverns, which possess some stalactites of singular beauty. According to Pliny, the island was once called Porphyrae. The ancient name of Cythera, the fabled birthplace of Venus, however, is as old as Homer. It was colonized by Phœnicians, and successively occupied by the Argives and Lacedæmonians. Its chief town in antiquity bore the name of the island. The modern chief town is Capsali, at its S. extremity.—The principal dependency of Cerigo is a little island called Cerigotto by the Italians (anc. *Ægilia*), now known as Lius to the inhabitants, lying about 20 m. S. E., midway between Cerigo and Crete, and containing about 40 families; length 5 m., breadth from 1 to 3 m. Cerigotto abounds with olive trees, and produces some fine wheat. In former times it was a noted retreat of pirates.

CERINTHUS, also called derisively **MERINTHUS** (*i. e.*, cord), a religious personage who is supposed to have come from Alexandria to Asia Minor, and to have resided at Ephesus simultaneously with St. John. He was a leader among those Gnostic Christian sects which appeared soon after the death of Christ; but, in common with the Ebionites, he considered an observance of the Jewish law essential to salvation, and believed in the notion of the vast chasm between God and the material world. He taught that it was not the Supreme God who revealed himself in the Jewish Scriptures, but a subordinate angel commissioned by the Supreme, with whom he identified himself. In this way he justified both the strictly divine character of Judaism to the Jew, and its subordination to Christianity to the Christian. Jesus he taught to be a mere man in his birth and existence until the baptism, when the Holy Ghost, which he considered to be the Christ, united itself with Jesus, and remained in this union until the crucifixion. Then, in time to leave the dying Jesus only a man again, the Christ or Divine withdrew. He attached no importance in the redemptive plan to the death of Jesus, but made salvation to depend on legal obedience. Caius, an anti-Montanistic writer, attempts to fasten upon Cerinthus the grossest

and most sensual millennialism, and even accuses him of having interpolated the Apocalypse to make it suit his chiliastic doctrines. It is true that Cerinthus taught the coming of a millennium on the earth, when Christ was to make Jerusalem the centre of his empire. This time he supposed would come after the earth had stood 6,000 years, and would be a perpetual sabbath of 1,000 years, a view which was common among the Jews of that age. His disciples were called Cerinthians, and also Merinthians. A *Historia Cerinthi* was published by Paulus (Jena, 1799).

CERITO, *Francesca*, commonly called Fanny, an Italian dancer, born in Naples in 1823. She made her début at the San Carlo theatre in 1836, and although only 13 was received with great enthusiasm. At Milan in 1838, and for two years at the *Kärnterthor-Theater* in Vienna, and afterward in Paris and London, the same storm of applause greeted her appearance, especially in London. She was married to Saint-Léon, well known in Paris and London as a dancer and violinist, and was separated from him in 1850.

CERIUM, a metal which was discovered simultaneously in 1803 by Klaproth, Hisinger, and Berzelius, and was so called by the last named after the planet Ceres. It occurs in association with lanthanum and didymium in cerite, allanite or orthite, yttrocerite; and a few other rare minerals. Cerite, containing also lanthanum and didymium, is the most abundant of these minerals. Wöhler prepared the metal in the following manner: The brown oxide, obtained by incinerating the oxalate, is dissolved in hydrochloric acid, and the resulting chloride mixed with about equal parts of chloride of potassium and chloride of ammonium, and evaporated to expel all of the ammonia, and finally fused. The slag thus obtained is pulverized, and while still warm is mixed with sodium and projected into a crucible previously heated. The reaction is continued until the soda flame disappears. The cooled mass contains metallic pellets. Cerium has a lustre between iron and lead, and loses its polish in the air. It is malleable, ductile, and soft as lead. Its specific gravity is 5.5 at $12^{\circ} C.$ Before the blowpipe it glows to a brown oxide; heated powerfully, it explodes with scintillation. The pulverized metal takes fire at $100^{\circ} C.$ It decomposes water slightly at the boiling point; is rapidly dissolved by HCl, converted to brown oxide by concentrated nitric acid, and is easily dissolved by weak nitric acid. Its compounds have a limited use in medicine and the arts.

CERRETO (anc. *Cernetum*), a well built town of Italy, on the Apennines, in the province and 12 m. N. W. of Benevento; pop. about 5,000. It has a cathedral, a collegiate church, a diocesan school, three convents, five annual fairs, and cloth manufactories. Near its site Pyrrhus was defeated in 275 B. C. In 1688 an earthquake destroyed a great part of the town.

CERRO GORDO, a mountain pass in Mexico, 40 m. N. W. of Vera Cruz, on the national highway to the city of Mexico, where a victory was gained by the Americans under Gen. Scott, over the Mexicans under Santa Anna, April 18, 1847. The entire American force in action and reserved was 8,500; the Mexican was estimated at more than 12,000. The action lasted from sunrise till 2 P. M., and resulted in the capture of 5 Mexican generals, 3,000 men, 4,500 stand of arms, 43 pieces of artillery, 7 standards, trains of stores, and Santa Anna's private baggage and money chest. The Mexican loss in killed and wounded was computed at from 1,000 to 1,200; the American loss was 63 killed and 368 wounded. Gen. Scott paroled his prisoners, destroyed their stores, excepting one field train, and the next day advanced to Jalapa.

CERRO GORDO, a N. county of Iowa, intersected by Shell Rock river and Line creek, and drained by Beaverdam creek; area, 652 sq. m.; pop. in 1870, 4,722. Clear lake is in the county. Peat is found and building stone is quarried. The McGregor and Missouri River railroad passes through it. The chief productions in 1870 were 138,592 bushels of wheat, 97,930 of Indian corn, 136,556 of oats, and 8,119 tons of hay. There were 1,515 horses, 1,435 milch cows, 1,977 other cattle, 1,914 sheep, and 1,542 swine. Capital, Mason City.

CERTALDO, a town of Italy, in the province and 15 m. S. W. of Florence, on the right bank of the river Elsa; pop. of the commune about 6,000. It was the place of residence and death of Boccaccio, who was buried here in the church of St. Michael and St. James. His sepulchre formerly stood in the centre of the church, and a more conspicuous monument was erected to him in 1503. His remains were removed in 1783, from a false interpretation of a law against burials in churches, and they were scattered and lost. His house, built of brick, with a small tower, was repaired in 1823 by the marchioness Lenzoni Medici, one of his descendants, and the fragments of stone which had covered his grave were collected by her in 1826, and placed in the house, with an inscription by the poet Giordani. A monument is to be erected to him by the authorities of Certaldo on Dec. 21, 1875, the fifth centenary of his death.

CERTIORARI (Lat. *certus fieri*, to be made more certain, to be certified), a writ used for the purpose of removing the record in a particular case, whether civil or criminal, from an inferior to a superior tribunal, either as an auxiliary process to enable complete effect to be given to some other process, or as a distinct mode of appeal. In American practice it is usually employed to review the proceedings of courts not of record, and of municipal corporations in certain cases, and the determinations of special tribunals, commissioners, and other officers exercising judicial powers which affect the citizen in his rights or his property,

and acting in a summary way, or in a course different from that of the common law.

CERUTTI, Joseph Antoine Joachim, a French author, born in Turin, June 13, 1738, died in Paris, Feb. 3, 1792. He became a member of the society of Jesus and a professor in its college at Lyons, where some of his essays were at first ascribed to Jean Jacques Rousseau. In 1762 he published *Apologie de l'institut des Jésuites*, and he resided after that period in Paris, and afterward at the country seat of the duchess of Brancas, near Nancy, devoted to literature and enjoying an income of 11,000 francs, chiefly through the influence of King Stanislas. In 1788 he published *Mémoire pour le peuple français*, which became very popular; and he was employed by Mirabeau in preparing his speeches, and subsequently delivered his funeral oration. He also published a weekly journal entitled *Feuille villageoise*, and was elected to the legislative assembly, but died soon afterward. The rue Laffitte was called after him till the restoration. His poem *Les jardins de Betz* was published in 1792, and a selection of his *Œuvres diverses* in 1793, the latter including his poem on chess.

CERVANTES SAAVEDRA, Miguel de, a Spanish author, born at Alcalá de Henares, Oct. 9, 1547, died April 23, 1616. His father was descended from an ancient Galician family, and his mother was a gentlewoman of refinement. Cervantes received the first rudiments of education from Lope de Hoyos, who published collections of poetry, to which his pupil, who early displayed a talent for poetical composition, contributed. One of these contributions, a pastoral poem entitled *Filena*, obtained some reputation, and attracted the attention of Cardinal Acquaviva, who in 1569 invited the young poet to accompany him to Rome. But the monotony of ecclesiastical life was little calculated to please Cervantes, and he joined in 1571 the armament commanded by Don John of Austria against the Turks. In the battle of Lepanto (Oct. 7, 1571) he received a wound, which deprived him of the use of his left hand and arm for the rest of his life; but he remained in active service till 1575, when, on his way from Italy to Spain, the galley in which he sailed was captured by Algerine corsairs. He was in their power till 1580, when his relatives and friends purchased his freedom. The whole romantic account of his captivity is found in the story of "The Captive" ("Don Quixote," part i.). He was treated with great cruelty by the Algerines, but his cheerfulness and philosophy excited the admiration of his fellow prisoners. He returned to Madrid in his 34th year, and here his literary career properly begins. The first work which he now produced was the pastoral romance *Galatea*, said to have been written in honor of his mistress, which showed a decided progress upon his *Filena*. In 1584 he married, and now had more than ever to resort to his pen to supply the wants of his family, and for

three years he wrote plays for the stage, which brought him little fame and less money. In 1588 he removed to Seville, where he acted as agent of a royal commissioner of the American fleet, and afterward as collector of public and private debts. During the latter part of 1597 he was imprisoned for about three months at Seville, for a small sum due to the government. From 1598, when he seems to have left Seville, to the beginning of 1603, when we find him established at Valladolid, we lose all trace of him. He is said to have spent the interval in La Mancha, and to have been sent there to collect rents due to a monastery; but the debtors, instead of making payment, persecuted him and threw him into prison. Here he is said to have begun "Don Quixote," laying the scene of the knight's earlier adventures in La Mancha, and making him a native of the village that treated him so ill. But no direct proof exists in support of this statement, although it is certain that he spent some time in La Mancha. We now come to the great literary performance of Cervantes. The death of Philip II. took place in 1598, and the relief which the end of his despotic rule brought to Spain was felt also in the world of letters. Cervantes could now give free vent to his opinions. In his youth at Rome he had observed in Cardinal Acquaviva's house the character of high life, and there, and subsequently in Spain, he was constantly brought in contact with persons eminent in church, state, and literature. With the camp and Moorish life he was thoroughly familiar, from his service in the navy and his captivity in Algiers. The mysteries of the stage, the characteristics of actors, were known to him from his career as dramatist. His frequent journeys had brought him into close contact with persons of all classes. His occupation at Seville and La Mancha had given him new opportunities of observation. With such a world of experience, with an inexhaustible stock of humor in his disposition, and with a love of the ideal and the heroic in his heart, he produced, in the full maturity of his genius, after having passed the 50th year of his age, his imperishable "Don Quixote." The first part was published at Madrid in 1605. In this work Cervantes hit the vulnerable point of his age. The common sense of the world had long rebelled against the mummeries of knight-errantry, and the foolish books that still spoke of chivalry of which not a vestige remained. People who had smiled when the absurdity presented itself to their minds, burst out in laughter when Cervantes gave it the finishing stroke. One day Philip III. observed from his balcony a student on the opposite banks of the Manzanares convulsed with laughter over a book. "He must either be crazy," said the king, "or he must be reading Don Quixote." This happened in 1606, after the court had removed from Valladolid to Madrid. Cervantes wrote the first part of the book probably during his residence at Valladolid,

where, after his return from Seville and La Mancha, he had taken up his residence. Although he received frequent visits from persons connected with the court and with the literary world, he was living with his wife, his two sisters, his niece, and a single female domestic, on the fourth floor of a mean house, and his pecuniary embarrassments were great. After his arrival at Madrid, while the publication of the first part of "Don Quixote" and its unprecedented success drew upon him the hostilities of those who resented the satire of his novel, he quietly occupied himself with the publication of his *Novelas ejemplares*, most of which had been written many years before, and of which he had already given a specimen in the story of the "Curious Impertinent," introduced in "Don Quixote." In 1614 he published the *Viage al Parnaso*, a satirical work, which gives a picture of the state of Spanish literature in his time, in which he describes himself as the oldest and poorest of Spanish poets. During the same year, while he was preparing for the press the second part of "Don Quixote," a continuation of the same story was attempted by a bungling plagiarist of Tarragona, whose real or assumed name was Avellaneda. This work contained invectives against Cervantes, and was probably published at the instigation of his enemies. The second part of "Don Quixote" made its appearance in the beginning of 1615, with a dedication to the count of Lemos, expressive of gratitude for kindnesses extended to him by the count. It was received with the same universal demonstrations of enthusiasm which had greeted the first part. Cervantes had at last gained the object of his ambition. He had the admiration of Europe, while even in Spain, as Lope de Vega was dead, there was no one to divide with him the literary empire. The sale of "Don Quixote" also relieved his pecuniary wants. But his health began to fail, and he had a presentiment of the close of his earthly career, indicated in the preface of his *Pérsiles y Sigismunda*, a serious romance modelled after the "Theagenes and Chariclea" of Heliodorus, which he prepared for the press at the beginning of 1616, though it was not published until after his death in 1617 by his widow. On April 19 he dictated to his wife the following words addressed to his friend Lemos, to whom he dedicated the work: "I have my feet already in the stirrup. I may use this expression since I feel that with one foot I stand in the grave. Yesterday I received extreme unction; to-day I resume my pen. The time is short, my sufferings grow more and more painful; my hopes grow fainter and fainter; yet I should be happy to see you before I die." Four days afterward he died, on the same day with Shakespeare.—Cervantes was of unusually fair complexion; his eyes were bright blue, his hair auburn. His countenance, handsome in youth, was spirited throughout his life. His manners were cheerful. He was beloved and

respected in every relation of life. He possessed himself the magnanimous disposition which he ascribes to his Don Quixote; but while in the knight the sentiment degenerates into folly, it bloomed in Cervantes into a genial, witty, humorous philosophy, which made him forbearing toward his enemies and amiable to his friends. *La Gitanilla* is the most interesting of his *Novelas ejemplares*. Of his dramatic compositions, his tragedy *La Numancia*, founded on the siege of that city, contains eloquent passages. His comedy *El Trato de Argel* gives a picture of Algerine life and manners, and is not destitute of interest. His miscellaneous literary productions, whatever their merit, are almost forgotten in the triumph achieved by "Don Quixote." Yet this great man was buried without any kind of distinction in the convent of the nuns of Trinity; the spot was identified in 1870 by the marquis of Molino. A common tombstone marks the place to which his ashes were removed at a subsequent period. No monument was raised to his memory till 1835, when a bronze statue of him, of heroic size, was placed in the plaza del Estamento at Madrid; and a small bust was placed in 1834 over the door of the house in the calle de los Francos where he died.—The most splendid editions of "Don Quixote" are those which appeared in 1780 at Madrid, in 4 vols., and at Paris in 1827 (Didot, 18mo). One of the best is the Madrid academy's fourth edition (5 vols., 1819), with a biographical sketch by Navarrete. The author's complete works, excepting his comedies, appeared at Madrid in 16 vols., 1803-'5, and also another edition in 1811, which however does not include his *Viage al Parnaso*. Arrieta, of Paris, published in 1826-'32 a selection of his works in 10 vols. Baudry's edition (Paris, 1840-'41) gives his complete works. A folio edition in 2 vols., profusely illustrated by Doré, was published in Paris in 1863, and in translation in London, with the plates, in 1864. Roscoe's "Life and Writings of Cervantes" appeared in London in 1839. The most eminent German translators of "Don Quixote" are Tieck (new edition, illustrated by Doré, Berlin, 1867-'8), Bertuch, and Soltau. The best English version is that of Motteux, with notes and additions by Lockhart. Among the Spanish biographers of Cervantes are Mayons y Ciscar and Pellicier; among the French biographers is Chasles (2d ed., 1866).

CERVIA, a town of Italy, on the Adriatic, in the province and 12 m. S.-S. E. of Ravenna; pop. about 6,000. It is situated in the vicinity of marshes which contain the most important salt works in the country, and is the seat of a bishopric.

CERVIN, Mont. See MATTERHORN.

CERVOLLE, or **Cervole**, **Arnaud de**, a French freebooter, born in Périgord about 1300, died in 1366. He was called *l'archiprêtre* because he held a benefice of that grade at Verona, though not in orders. He was wounded and taken

prisoner at the battle of Poitiers (1356); but having been ransomed he returned to France the next year, and raised a large band who pillaged the south of France in the name of the king, then a captive in England. He marched upon Avignon, at that time the residence of the pope, and compelled Innocent VI. to pay a large sum to save the property of the church from pillage. In 1359-'60 he was in the service of the dauphin; but resuming his career of freebooter, he forced the count of Nevers to enter into a treaty with him, and reentered the service of the dauphin, who had become king as Charles V., by whom he was appointed chamberlain. In 1365 he offered to lead his companies on a crusade against the Turks. He directed his march toward Hungary, but after traversing Champagne and Lorraine was stopped by the Germans at Metz, where he attempted to cross the Rhine. He then ravaged Alsace, but the peasants took up arms, and he was defeated in several encounters. He went back to France, and according to some accounts was killed by one of his followers; but according to others he died a natural death in Lorraine.

CESARE, Giuseppe, cavaliere di, an Italian historian, born in Naples in 1783, died there, April 15, 1856. He was at the head of the custom house of his native city till 1827, when he was dismissed. When the constitutional party came into power in 1848, he was appointed governor of the province of Terra di Bari, but tendered his resignation as soon as absolutism was again triumphant. He subsequently wrote *Arrigo di Abbate* and *Lettere romane*, historical novels. But his most important production is his *Storia di Manfredi, re di Sicilia e di Puglia* (1837), which clears Manfred's memory from the imputations of previous writers. For several years he edited a periodical entitled *Il Progresso*, and he is the author of a history of the Lombard league.

CESARI, Antonio, an Italian author, born in Verona about 1760, died in Ravenna, Oct. 1, 1828. He took holy orders, and early joined the order of Oratorians. His principal works include new editions of the *Vocabolario della Crusca* (6 vols., 1806-'9), *Bellezze della Commedia del Dante* (1824-'6), and translations of Horace, Terence, and Cicero. Four separate biographies of Cesari have been published in Florence, Verona, Padua, and Ravenna (1829-'42).

CESARI, Giuseppe, or **Giuseppino**, better known as cavaliere d'ARPINO, an Italian painter, supposed to have been born in a Neapolitan castle of the latter name about 1560, died in Rome about 1640. The son of a poor artist, he went as a boy to Rome, and was employed in a menial capacity by artists engaged in executing paintings for Gregory XIII., when his talent was brought to the pope's notice and procured for him a superior education and the patronage of this and succeeding popes, and he was created knight of St. John of Lateran. His frescoes and

oil paintings were exceedingly successful, and he was regarded as among the most brilliant mannerists of his day; hence he served as a target for the attacks of the *naturalisti* school of the Carracci and others. Many of Cesari's works are in Rome, including his most famous production, which is a series of frescoes from early Roman history, in a compartment of the Capitol bearing his name.

CESAROTTI, Melchior, an Italian poet, born in Padua, May 15, 1730, died Nov. 3, 1808. He was professor of rhetoric in the university of Padua, and gained a high literary reputation by his translation of Ossian into Italian blank verse (1762). He also produced a translation of Plutarch (1763), a free version of the Iliad (1795), a great number of academical essays, poems, and letters (included in his *Opere scelte*, Milan, 1820), and a remarkable philological work, *Saggio sulla filosofia delle lingue*. In 1807, at Milan, Napoleon made him a knight of the iron crown and bestowed a pension on him. A complete edition of his works appeared at Pisa in 1805-'13, in 42 vols. 8vo.

CESENA, a city of Italy, in the province and 12 m. S. E. of Forlì, on the Æmilian way, and on the right bank of the river Savio; pop. in 1872, 35,870. It is the seat of a bishop, has a cathedral, a seminary, a large town hall, a fountain, and a colossal statue of Pope Pius VI., who was born here. There is also the Capuchin church, containing a fine painting by Guercino, a library founded by the duke Malatesta in 1452, rich in MSS., and at a short distance the Benedictine monastery, long the residence of Pius VII., also a native of this place. A few miles S. of Cesena are extensive sulphur mines, which supply the works at Bologna and Rimini. It has a considerable trade in wine and hemp.

CESNOLA, Luigi Palma di, count, an American soldier and archaeological explorer, born in Turin, Italy, July 29, 1832. In 1848, at the age of 15, he left the royal military academy at Turin, and enlisted as a volunteer in the war against Austria. He then returned to the military academy, and graduated, receiving his commission in 1850, which he resigned in 1854. Upon the breaking out of the Crimean war he reentered the army, and served upon the staff of Gen. Ansaldi. The close of the war precluded all prospect of advancement in the Italian military service, and after a while he embarked for America, landing at New York in 1860. Here for many months he supported himself by giving instruction on the flute and lessons in French and Italian. In the spring of 1861 he married one of his pupils, a daughter of Commodore Reid of the United States navy. Soon after the outbreak of the civil war he established classes for military instruction, and not long after became colonel of the 4th regiment of New York cavalry. He was present with his regiment in 18 engagements up to the fight at Aldie, June 17, 1863, where he was wounded, taken prisoner, and

confined in the Libby prison, Richmond. In April, 1864, he was exchanged for Col. Brown, brother of the governor of Georgia, and afterward took part in the subsequent operations in Virginia. At the close of the war he was breveted brigadier general, became an American citizen, and was appointed consul at Cyprus, his place of residence being Larnaka, the principal seaport, which stands on the necropolis of the ancient Chittim of the Phœnicians, the Citium of the Romans. There in 1845 had been discovered a bass relief in black basalt, bearing a cuneiform inscription denoting that it was a present from Sargon, king of Assyria (721-704 B. C.), to his vassal, the king of Chittim. At Larnaka Cesnola heard of a massive stone vase, 7 ft. high and 11 ft. in diameter, weighing 30,000 lbs., and supposed to belong to the 9th or 10th century B. C., which the emperor Napoleon had just presented to the museum of the Louvre. His attention was soon attracted by some ancient coins and fragments of terra cotta in possession of the inhabitants of Larnaka, and he began to open some of the tombs, in which he found many objects of antique art. In 1866, while residing at Dali, 20 m. N. W. of Larnaka, a curious stone was shown to him lying several feet below the surface of the ground. He perceived that it was a part of a tomb, and making excavations he discovered that Dali occupied the site of the necropolis of the ancient Idalium, a city which ceased to exist almost 2,000 years ago, where once stood a great temple of the Venus of Cyprus. Procuring a firman from the sultan, he commenced excavations. These were continued, here and elsewhere, for three years, employing some hundreds of men, during which more than 8,000 tombs had been opened, when at last the jealousy of the Turks was aroused, and an edict from the sultan prohibited all further excavations in Cyprus. But in the mean time Cesnola had accumulated a magnificent collection of antiquities, which in 1872 was purchased for the metropolitan museum of New York; a collection which for extent and historical and artistic value is unequalled by any other of the kind in the world. The number of articles is not yet fully ascertained, but in August, 1870, when it was examined by the representative of the Russian imperial museum, there were about 13,000 articles, among which were many statues and statuettes, 1,800 lamps, 5,000 vases, 2,000 coins, 1,700 pieces of glass ware, 600 gold ornaments, 300 bronzes, and 100 inscriptions. In July, 1870, the emperor Napoleon made a large offer for the collection, then in Cyprus, for the imperial museum of the Louvre, the cost to be paid from his own private purse; but when Cesnola's acceptance of the offer reached Paris, the emperor was a prisoner. In 1872 Cesnola sent the entire collection to London for sale, where it was thoroughly examined by experts connected with the British museum, and others, and its value was fully recognized; but for

some unexplained reason the attention of the trustees of the museum was not called to it, and when Cesnola came to London he found that the knowledge of the existence of his collection was confined to a few persons connected with the museum, and no one in Europe seemed inclined to purchase. At this juncture an American gentleman made a liberal offer for it, which was at once accepted, and Cesnola's cherished desire that his collection should go to his adopted country was realized. When this became known in England, great indignation was expressed that the British museum should have lost the chance of becoming the possessor of this unique collection.—Cyprus being situated midway between Phœnicia and Greece, and having been long under Egyptian domination, its art bore the characteristics of all these countries. Perhaps the most notable single object is the colossal statue found at Golgos, 10 miles from Larnaka, in the



The Colossus of Golgos.

buried ruins of whose temple were discovered the mutilated remains of more than 1,000 statues. The colossus is 28 ft. in height. Upon the head is the helmet-shaped Assyrian cap; the long beard is in four curled plaits. It is supposed to represent a high priest, and to date from the 18th century B. C. No European museum possesses so old a statue. The oldest heretofore known were some Assyrian and Egyptian statues dating between the 8th and 14th centuries B. C. In the Cesnola collection are several other statues probably nearly as old as this colossus. The Egyptian type is well represented, one of the best preserved statues being that of a female figure holding the lotus. Among the works of the Greek type are sepulchral bass reliefs, with inscriptions; Venus with her attendants; Urania; a life-size draped statue of a priest of Venus of the Macedonian period, the head wreathed with laurel, an olive branch in the right hand, and a symbol in the

left; colossal heads with the shelly hair of early Greek art; fine statues of children and youths; and antique heads of the noblest Hellenic type. Among the marble and alabaster statuettes are Venus holding a dove, Pan playing the pipes, and women performing on the tambourine and harp. There are heads without number, Greek, Roman, and Egyptian, heads of animals, and implements of all kinds. The objects in terra cotta are numerous, some plain, others colored red or black. Venus with her attendants is a favorite subject. There are chariots and horsemen, dancing girls, grotesque masked figures, a donkey, a lioness with whelps, bulls, goats, and birds. There is a toy horse on four wheels, with a hole, doubtless for a string. This was taken from the tomb of a child, whose plaything it was perhaps long before the first Olympiad. In bronze there are statuettes of Osiris, Minerva, and Pomona; bracelets, anklets, rings, and amulets; brooches, buckles, tweezers, and mirror cases; battle axes, javelins, and arrow heads. Vases of every material, size, and shape are numerous; there are more than 1,000 different designs. Some of them are 3 ft. high and 4½ in diameter, and, though probably 3,000 years old, are as fresh as when they came from the maker's hand. In the collection of jewelry are rings of various sorts, some with precious stones, as sapphires, carbuncles, and carnelians; clasps, beads, and spoons; mortuary plates of pure gold, which were tied upon the forehead of the dead, bearing designs in low relief of acanthus leaves, lines, scrolls, and sometimes female figures. There are gems and stones engraved with mythological and other designs, Minerva in carnelian, Mercury in jasper, Mars in garnet; heads in onyx and agate; and some fine paste cameos. The collection is specially rich in glass ware, of every shape, form, and purpose; cups ribbed and iridized, blue and ribbed, white opaque; a bowl of dark blue with iridized tints of green and purple; bottles with raised spiral lines in blue and amber, or with serpents in relief trailing over the surface. One wine cup, with a yellow ground, has feather ornaments in blue and yellow, with serpentine handles of opaque glass. The collection of coins was of great value and interest, but it was lost by the shipwreck of the vessel in which it was sent from Beyrout to England. In it were coins belonging to the best Greek period, the age of Phidias. There were coins of the Greek imperial class, among which were those of Alexander, the Seleucidæ, and a series of those of the kings of Cyprus. There was one beautiful gold coin, weighing 22 dollars, struck by Ptolemy Philadelphus. There were also Indian, Greek, Ptolemaic, Cypriote, Roman, Byzantine, Lusignan, and Venetian coins, in gold, silver, and bronze. The inscriptions promise to be of great historical value. So recently as 1863, the duke de Luynes stated that there were only three known inscriptions in the Cypriote language, and these had not been

deciphered. In the temple at Golgos alone Cesnola found 34 inscriptions, and his whole collection contains about 100. In some respects the preservation and discovery of these Cypriote remains is more remarkable than in the case of those of Assyria. The latter were buried in the destruction of the palaces where they were found, the sites of which have been uninhabited almost ever since. But in Cyprus the sites of the tombs have been for many centuries covered over by inhabited towns, and scores of generations have lived and died on the spot, never dreaming of the treasures which lay buried a few feet below. The discovery of the buried temple of Venus at Golgos was in every way remarkable. It was known very nearly where it must have stood. Between 1817 and 1864 French archæologists expended several hundred thousand francs in excavating for it; but they dug a few miles away, and only found the site of the ancient city, now occupied by a small village. In 1866 Cesnola excavated in the same place, and of course unsuccessfully. In the winter of 1869-70 he thought he had found the site of the necropolis, but on digging down came upon the famous temple itself, with its rich collection of antiquities. After that he purchased the ground of the village of Kuklia, 60 m. S. W. of Larnaka, which he had satisfied himself was the site of the ancient Paphos, close by the spot where Venus is said to have risen from the sea, and where was the chief seat of her worship. Here he hoped, not without reason, that he should come upon some of the famous works of Praxiteles and Lysippos, when his hopes were blasted by the edict from the sultan forbidding all further excavations in Cyprus. But the value of what he had already accomplished is beyond all price. Only a single collection of the kind at all approaches his, and that is the famous Kertch collection of Greek antiques, formed, it is said, by the royal collector Mithridates the Great, which has found a resting place in the imperial museum of the Hermitage at St. Petersburg.

CESPEDES, Carlos Manuel de, president of the revolutionary republic of Cuba, born in Bayamo, April 18, 1819. His education commenced in the Dominican convent of his native city, and was completed at the university of Havana, in which city he was admitted to the bar. Before entering upon the practice of his profession he travelled in Europe, and a previously acquired knowledge of several languages enabled him to study advantageously the customs and institutions of other countries. During his stay in Spain some remarks offensive to his country and countrymen, by a Spanish military officer, led to a duel in which his opponent was killed. When in Madrid, Cespedes was implicated with Gen. Prim in a conspiracy for the overthrow of the government, in consequence of which he was forced to leave the country. On his return to his native city in 1844 his talents and popularity soon gained for

him a large legal practice, and his influence and his outspoken censure of the Spanish colonial system at once rendered him a subject of suspicion to Spanish officials. The revolutionary expeditions of Lopez, and the uprisings of Agüero and others in Camaguey, were warmly sympathized in by Cespedes, in consequence of which he was put in prison, then forced to leave Bayamo, and reside in Manzanillo and subsequently in Baracoa. When the revolutionary movement broke out in 1868, he was chosen its supreme chief. One of his first acts was to liberate the numerous slaves upon his valuable sugar estate Demajagua; and on Oct. 10, 1868, at the head of a few poorly armed followers, he proclaimed the independence of Cuba on the field of Yara, a place rendered historic 300 years before by the execution of the Cuban cacique Hatuey by the Spaniards. On the formal organization of the republic of Cuba at Guimaro, in the Central department of the island, on April 10, 1869, Cespedes was elected president under the constitution then adopted.

CESPEDES, Pablo de, a Spanish artist and author, born in Cordova in 1538, died there in 1608. He studied the works of Michel Angelo and the great Italian colorists, and during the pontificate of Gregory XIII. acquired distinction as a painter. About the year 1577 he returned to Cordova, and became prebendary of the cathedral. He spent his vacations at Seville, where he established a museum of ancient art. Cespedes was one of the best colorists in Spain, and a successful imitator of Correggio. He was an accomplished scholar, left a poem on painting and some essays on art, and had a considerable reputation as a sculptor and architect.

CESTUS (Gr. *κεστός*, embroidered), with the ancients, a band or tie of any kind, particularly applied to the embroidered zone or girdle of Venus, famed for its power of awakening love. By this (*κεστός ἰμάς*), according to Homer, Venus captivated Mars, and Juno borrowed it in order to win the affections of Jupiter. The Romans applied the term also to the thongs or bands of leather tied around the hands of a class of boxers, from them called *cestuarii*. The Greeks used different kinds of cestus under different names. The cestus of the Roman boxers was often loaded with lead or iron, and the word is supposed by some to be a modified form of *caustus*, derived from *cadere*, to kill.

CETEWAYO. See supplement.

CETIGNE. See CETTIGNE.

CETTE, a fortified seaport of France, in the department of Hérault, 17 m. S. W. of Montpellier; pop. in 1866, 24,177. It is built on the slope and at the foot of a hill (anc. *Mons Setius*), on a tongue of land between the lake of Thau and the Mediterranean, which are united by a canal that traverses the town and terminates in the harbor. Next to Marseilles, Cette is the most important commercial port in S. France. It is an outlet of the southern wine

districts; the canal du Midi connects it with Bordeaux, and the canals des Étangs and de Beaucaire and the Rhône connect it with Lyons; and it is the termination of the Paris, Lyons, and Mediterranean network of railways. The great northern railway connects Cette with Bordeaux and Toulouse, and the Lyons-Mediterranean railway with Montpellier, Nîmes, and Tarascon. There are steamers to Algiers, Marseilles, Cannes, and Nice. The town, founded by Louis XIV., owes its rise to the mole, which was commenced in 1666, and which shelters the harbor on the south. At its end, on the left of the entrance to the harbor, is Fort St. Louis, which is surmounted by a lighthouse. A breakwater in front of the harbor prevents the accumulation of mud, and the other side of the harbor is formed by a pier, on the extremity of which rises Fort St. Pierre, completing, with a citadel on the opposite cliff, the defences of the port. The harbor has a depth of from 16 to 19 feet, and is safe in any weather. Cette is the centre of an extensive coasting and foreign trade. The entrances in 1870 were 2,613 vessels, of which 692 were steamers; the clearances, 2,624, of which 692 were steamers. The exports amounted to \$5,414,725, of which wine formed \$3,462,063; the imports were \$13,177,199, of which timber, staves, grain and flour, brimstone, and codfish were the leading articles. There is a large manufacture of so-called Madeira wines, produced by the mixture of French and Spanish wines and brandy. The salt works in the neighborhood are the most important in France. The fisheries of sardines, cod, and oysters employ some hundreds of vessels. There are also glass works, extensive ship-building yards, and establishments for the production of sulphates of soda, magnesia, and potash by evaporation from sea water. Casks, corks, soaps, sirups, grape sugar, and perfumes are made there. Cette possesses a tribunal of commerce, various courts of justice, an imperial hydrographic school, a communal college, a public library, and a theatre, and is a favorite resort for sea bathing. It was laid out in 1666 after Colbert's designs, at a great cost, and the works of the harbor were executed by M. Riquet, the engineer of the canal du Midi. In 1710 a small British force, designing to effect a junction with the insurgents of the Cévennes, took possession of Cette, but was driven back after a few days.

CETTIGNE, or *Cetigne* (Slavic, *Zetinie*; Ger. *Zettinje*), the capital of the principality of Montenegro, situated on a hill about 10 m. E. of the Adriatic, and 37 m. N. W. of Scutari; pop. about 700. It is fortified, has a convent and a school, and on a plain below the village is the government house of the principality. It carries on some trade with Dalmatia, the nearest port being that of Cattaro, and has a powder mill.

CETUS (the whale), a large constellation of the southern hemisphere, containing 97 stars,

and said to represent the monster which was going to devour Andromeda. Its brightest star, named Menkar, comes on the meridian at 8 o'clock in the beginning of January.

CEUTA (anc. *Septa*; Moorish, *Sebta*), a town and fortress on the N. coast of Fez, Morocco, belonging to Spain, and included in the province of Cadiz; pop. about 7,000. It is situated at the E. entrance of the strait of Gibraltar, where a small peninsula juts out in a N. N. E. direction exactly opposite Gibraltar, being joined to the mainland of Africa by a narrow but well fortified isthmus, on which the town is built. The N. E. of the town is almost entirely occupied by the Monte del Hacho (the anc. *Abyla*), which is a spur of the range of mountains called Jebel Zatout (anc. *Septem Fratres*). On the highest part of the mountain stands the citadel of Ceuta, with a garrison of 5,000 men. The town is well built, gives title to a bishop who is suffragan of the archbishop of Seville, and is the seat of a military governor and of a royal court of justice, and the chief of the Spanish *presidios* or convict establishments on the African coast. The other presidios, comprising in all an area of 32 sq. m. and a convict population of about 11,000, are under the charge of the governor of Ceuta. The town is clean and paved in a mosaic pattern, has a cathedral, several convents, and a house of mercy founded in 1498. The harbor is unsafe, and there is little trade.—Ceuta was a town of Mauritania Tingitana under the Romans. In 1415 John I. of Portugal wrested it from the Moors, who in their invasions of Spain first set out from Ceuta. In 1580 it passed with Portugal to Philip II. of Spain by conquest, and was formally ceded by Portugal to Spain by the treaty of Lisbon of 1668. Afterward it was several times unsuccessfully besieged by troops from Morocco. At the beginning of this century it was held for a short time by the English.

CÉVENNES, a mountain range of France, which separates the valleys of the Garonne and the Loire from those of the Saône and the Rhône. In its widest sense it extends over more than 300 m., and is divided into the S. and N. Cévennes. The former, which contain extinct volcanoes, assume successively the names of Black, Espinouse, Garrigues, and Lozère mountains, and form the group of Gévaudan, several branches of which diverge in various directions; the most important, running N., connects with the cluster of mountains of volcanic origin known as the mountains of Auvergne. The highest points of the Cévennes are Mont Mezin, 5,790 ft., and Mont Lozère, 4,870 ft. The northern are of less importance, and are scarcely more than hills, under the names of Vivarais, Lyonnais, Forez, and Charolais mountains. They connect with the Vosges through the hills of Côte d'Or, the plateau of Langres, and the Faucilles mountains. Several rivers rise in this chain, the most important of which flow N. W. or W. to

the Atlantic, such as the Loire, the Allier, the Lot, &c. The Hérault and the Gard, which run in an opposite direction to the Mediterranean and the Rhône respectively, are but short streams.—Cévennes was also formerly the name of a French province, which formed the N. E. part of Languedoc, and was divided into Gévaudan, Velay, Vivarais, and Cévennes proper, the respective chief towns of which were Mende, Le Puy, Viviers, and Alais. It is now included in the departments of Haute-Loire, Lozère, Ardèche, Aveyron, and Gard.

CEYLON, an island in the Indian ocean, belonging to Great Britain, between 50 and 60 m. from the S. extremity of Hindostan. It is separated from the mainland by the gulf of Manaar and Palk strait. Its limits extend between lat. $5^{\circ} 55'$ and $9^{\circ} 51' N.$, and lon. $79^{\circ} 52'$ and $81^{\circ} 55' E.$ It is oval, nearly pear-shaped, extending in length N. and S.; is 266 m. long; greatest breadth $140\frac{1}{2}$ m., average breadth about 100 m.; area, 24,705 sq. m.; pop. in 1871, 2,405,287. On the N. W. its shores are low and sandy, and a succession of bold rocks, stretching across the gulf of Manaar, together with the holy island of Ramisseram, nearly connect it with the mainland. From its position and geological character, Ceylon appears to have been once part of the mainland. The straits which separate the island from it are navigable only for small vessels. The main western channel has been widened and deepened by the British government, and is now traversed by vessels of 300 tons, thus much facilitating the coasting trade, and materially shortening the voyages between the Malabar and Coromandel coasts. The W. and S. coasts are low, much indented, and lined with cocoanut and other palms. Numerous small harbors are found along this shore. The E. coast, from Matura to Trincomalee, is an arid but bold and precipitous shore. On these sides the line of coast is of varying depth, from 30 to 80 m., surrounding the mountain ranges which form the centre of the island. The N. shore is a vast arid and sandy plain, teeming with swamps and jungle. The pearl oyster banks are on the W. coast, and when the fisheries are opened, vast but temporary towns are suddenly formed and as suddenly abandoned, by pearl fishers and speculators in pearls. The island possesses two excellent harbors, Trincomalee on the N. E. and Point de Galle on the S. coast. Colombo, the capital, on the W. coast, has but an open roadstead; and Point de Galle is the principal port of the island. There are several smaller harbors, suitable for coasting vessels. The roads of Colombo afford safe but stormy anchorage; but at particular seasons, especially June and October, communication with the shore is difficult and hazardous. Other harbors are Batticaloa, Matura, and Caltura on the E. and S., and Negumbo, Chilaro, Calpenty, Manaar, and Point Pedro on the W. and N. W. coasts. There are numerous small islets along the coasts, and two considerable peninsulas, Jaffnapatam on the N. W. and Calpenty on

the W.—The mountain ranges of Ceylon rise in the centre of the southern or broader part of the island. The general direction of the chief ranges is from N. to S.; but several ranges branch off in various directions. Several peaks or summits rise to a great height. Pedrotalagalla, an abrupt peak, the highest on the island, is 8,280 ft. high, and Adam's peak, 7,420. The greater part of the fertile and highly cultivated hillside country ranges between 2,000 and 4,000 ft. high. The plain of Newera Ellia, the sanatorium of the island, is at an elevation of 6,210 ft. Candy, the capital of the central province, and former capital of the independent kingdom, is 1,678 ft. above the sea. Adam's peak is the most remarkable summit on the island. It is resorted to by Mohammedan and Buddhist pilgrims, being one of their holy places. (See ADAM'S PEAK.)—The island has numerous small rivers and brooks, but no considerable streams. Few are navigable for



Adam's Peak.

more than a few miles from their mouths. The chief is the Mahavelli Gunga, which rises in the southern highlands, flows N., and empties into the bay of Trincomalee; it is nearly 200 m. long. The next, the Kalani Gunga, has its source at the foot of Adam's peak, and falls into the sea near Colombo. There are no lakes of importance in the interior, but several extensive lagoons on the E. coast. Some of these are connected by canals and natural streams, and are used for purposes of commerce. Artificial lakes, the relics of native undertakings of former days, are found. One is still in good condition, and serves to irrigate a large district between Candy and Trincomalee. It is 20 m. in circumference, and its waters are imprisoned in the valley which contains them by a vast embankment 60 ft. wide at top. Another, now in ruins, appears to have been kept in bounds by a wall of masonry 12 m. long and 160 ft. thick. These collections of water were

formed by damming the natural outlets of the mountain streams at the mouths of extensive valleys. They were of great service to the country when more densely populated and thoroughly cultivated than now.—A belt of gray and black sandstone and coral formations nearly encompasses the island. The rocks of the interior are mostly primitive, consisting of granite, gneiss, large veins of quartz, &c. Limestone occurs only in Jaffnapatam and the northern districts. The surface soil is mostly sandy. The soil of the cinnamon plantations near Colombo is perfectly white, and consists of pure quartz. Ores of iron, lead, tin, and manganese are found in the interior. Plumbago of excellent quality occurs. Quicksilver mines exist, and were formerly worked by the Dutch. The most valuable gems are the ruby, sapphire, amethyst, cat's-eye, and carbuncle. Cinnamon stones and garnets exist in great plenty. Iron ore is worked up by the Cingalese in a rude way, but with considerable success, the iron being equal in temper to the best Swedish. Salt, which is found in beds, is a monopoly of the government and affords a considerable revenue.—The climate of Ceylon differs little from that of the neighboring part of India; but the island is much healthier than any portion of southern India. The N. E. and S. W. monsoons mark the changes of the seasons, which occur on the seacoasts in May or June and October or November, bringing with them heavy thunder storms. The highest temperature at Colombo is about 87°; on the coffee estates it is stated at between 56° and 80°; and in the high valley of Newera Ellia, during January and February, the mercury falls as low as 31°. The prevailing diseases of the country are cholera, dysentery, and fevers. Elephantiasis is a disease peculiar to the natives. The beriberi (*hydrops asthmaticus*) is another disease nearly peculiar to the island.—The zoology of Ceylon bears a general resemblance to that of the adjoining mainland. The elephants are of a less tractable species than those of India and Africa. They exist in great numbers in the interior, and commit frequent ravages upon the native fields. They are often trapped in vast kraals, into which they are driven by a great assemblage of natives. Of late years English huntsmen have killed very many of them for sport. According to Sir J. E. Tennent, not one elephant in a hundred is found with tusks in Ceylon. Oxen of small size and buffaloes are used as draught animals. There are four species of deer and a great variety of monkeys, as well as the jackal, squirrel, porcupine, wild boar, bear, and one species of anteater. Leopards are met with, but they are not numerous and seldom attack man. Of birds there are all the varieties common to the tropics. There are several species of serpents, including the venomous tic polonga, the cobra de capello, and gigantic pythons, as well as ten species of tree snakes. Crocodiles are found in the rivers, scorpions and huge spiders

in the houses, and lizards in the woods. Fish are of many varieties, and in great abundance, some of excellent quality for eating.—The vegetable products are numerous and valuable. There are 416 known varieties of valuable woods, of which 33 are used for house, furniture, and ship building. Among these are satinwood and ebony. The cocoanut palm is altogether the most useful tree to the natives. It grows readily without cultivation, is not limited to one soil, and every part of it is made use of by the Cingalese. The fruit, when green, supplies food and drink; when dry, oil; the sap is made into toddy and arrack; the fibrous husk furnishes ropes, nets, and matting; the nutshells form household utensils; the plaited leaves serve the same purpose, and also for thatch; the dried flower stalks serve as torches, and the large leaves as fences. The trees bear from 50 to 100 nuts per annum, and often grow so near the water's edge that the waves wash their roots. There are several other varieties of palms, one of which furnishes in its wide-spreading leaves the umbrella which is a notable article of Cingalese use. The fruit of the betelnut palm is exported. Besides native fruits, which are not numerous, various European and Indian fruits have been introduced latterly under the auspices of English planters, who have formed an agricultural society. Cinnamon, which grows wild in the forests, is cultivated to a large extent, arrives at a high state of perfection, and has long been an important article of export. Its cultivation was formerly a government monopoly, but was thrown open to the public in 1833. When growing wild, the cinnamon plant attains a height of 20 to 30 ft.; cultivated, it is not allowed to grow so thriftily, the young shoots giving the finest bark. Coffee flourishes, and has latterly been the chief article exported to Great Britain. Rice, cotton, tobacco, and pepper are also cultivated. Breadfruit grows abundantly. The sugar cane does not succeed. There are two rice harvests annually, January to March, and August to October.—The population (exclusive of Europeans) consists of four classes: the native Cingalese; Moors, who are Mohammedans of Arab descent; Veddahs, a savage, perhaps aboriginal race, inhabiting the mountain fastnesses; and the Malabars and other Hindoos, who immigrated from the neighboring continent. The religion of Buddha is the dominant native creed. There are four great political castes, and 24 minor ones. The Cingalese are singularly mild and inoffensive in their manners, and make very poor soldiers. Their genius seems to be for agriculture and for peace. Christianity was introduced in the 6th century, but subsequently died out, and was revived by the preaching of St. Francis Xavier in the 16th century. The mission was very successful; a Jesuit college was established, and the province of Jaffna became almost wholly Christian. The Dutch banished the Catholic priests and nuns, and gave employment to no unbaptized

native; thus the population connected with the Dutch Reformed church rose to 425,000; but after the cession of Ceylon to Great Britain the Dutch church soon died out. The Roman



Cingalese.

Catholic church has at present two vicariates apostolic, Colombo and Jaffnapatam, with a membership of about 140,000, and about 260 churches. Protestant missions have been established by the church of England, which has a bishop at Colombo, by the English Wesleyans and Baptists, and by the American Congregationalists. The aggregate membership of these churches is about 3,000. The missionary efforts of the Catholics and Protestants induced the Buddhists to form in 1860 a society to propagate the doctrines of Gautama by itinerant preaching, the press, and colportage. Education is making great progress. There were in 1870 about 900 schools in the colony, attended by 30,000 pupils, of whom about 1,500 were girls. The schools are partly free public schools supported by the government, and partly church schools established by the missionary societies, and aided by money grants from the governments. The most important government institutions are the Colombo academy, consisting of an upper and lower school, and a normal training school in the same city. —Ceylon is what is known as a crown colony, the English sovereign possessing, through the governor, direct control of the colonial legislation. It is divided into six provinces, which, with their population in 1871, are as follows: Western province, 776,930; Central, 494,626; Southern, 399,452; Northern, 340,169; Northwestern, 276,033; Eastern, 118,077. The government is administered by a governor (in 1873 William Henry Gregory, appointed in December, 1871), with an executive council of 5 and a legislative council of 15 members. All

questions relating to the revenue of the island must receive the sanction of the governor before they can be debated in the legislative council. In 1871 the revenue was £1,121,679; expenditure, £1,064,184. The public debt was £700,000.—The pearl fishery was long a source of annual income to inhabitants and government. After lying untouched from 1837 to 1855, the banks, which are situated off the western parts of the coast, have again yielded profitable returns. Rice is the staple grain. The cultivation of coffee dates only from 1834; the average production is from 6 to 9 cwt. per acre. In 1870 there were exported 921,506 cwt. of plantation, and 132,524 cwt. of native coffee. The yield of cinnamon varies, according to the mode of cultivation, from 50 to 500 lbs. per acre; in 1870 there were exported 20,716 bales, of 100 lbs. each. The planting of the cocoanut palm, for the sake of the oil, has within a few years been successfully carried on by Europeans; in 1870, 13,566 cwt. of oil were exported. From Great Britain are imported cotton manufactures, hardware, glassware, metals, tools, beer, wine, &c.; from India, especially grain. The arrivals of vessels in the ports of Ceylon in 1868 were 3,257, of 614,947 tons; clearances, 3,182 vessels, of 631,647 tons. The value of exports in 1871 was £3,804,000 (to the United Kingdom, £2,633,000), and of imports £4,634,000 (from the United Kingdom, £1,462,000). Both imports and exports have enormously increased since 1850, in which year the imports were only £1,488,000, and the exports £1,246,000. The increase of imports has been most considerable in grain; that of exports, in coffee. The banking business is conducted by branches of the Oriental bank of London and the Mercantile bank of Bombay, the former establishment possessing the privilege of issuing notes of 10s. and upward. The foreign trade of Ceylon is carried on mainly by European firms, the native houses confining their transactions to British India, and the small native dealers, called chitters, to their connections with Madras and Bombay merchants. Great exertions are made for improving the public roads; in 1868 more than £230,000 were expended on them. Colombo and Candy have been since October, 1867, connected by railway, and nearly all the important places of the island by telegraph. —Ceylon was known to the Greeks and Romans under the name of Taprobane. Pliny relates that Onesicritus, a captain of Alexander the Great, first circumnavigated it, and thus discovered it to be an island. Before this it was supposed to stretch indefinitely south. Serendib was a former name of the island. *Zeylan*, of which Ceylon is a corruption, is said to be from *zinbal*, Hindostanee for lions. The Cingalese annals profess to contain a historical record of events for 24 centuries back. These, and the extensive ruins of ancient cities (see POLLANARUA), show that it was thickly settled by a people of energy and civilization,

even at that remote period. An Indian conqueror is said to have introduced caste about 550 B. C. The island was visited by traders at an early period, by Marco Polo in the 13th and by Sir John Mandeville in the 14th century. Dom Lorenzo Almeida, a Portuguese, visited it in 1505, and was hired by an annual payment of cinnamon to defend its shores against Arabian pirates. He found it divided into seven separate kingdoms. Through Almeida the Portuguese obtained footing upon the island, and held it for 150 years. Capt. Knox, an Englishman, fell into the hands of the Candians in the 17th century, and in 1681 published an interesting account of his 20 years' captivity. In 1656 the Dutch expelled the Portuguese. In 1795-'6 the British expelled the Dutch. The island at first belonged to the East India company, and was a part of the Madras presidency, but in 1802 reverted to the British crown. In 1815 the Candians, whose territory occupied the entire interior of the island, and who were independent of foreign rule, called upon the British to depose their tyrannous prince, thus offering a convenient opportunity for the annexation of this valuable territory. In 1817 an extensive rebellion was successfully put down. In 1843 and 1848 there were minor attempts at rebellion.—See Sir Samuel W. Baker's "Rifle and Hound in Ceylon" (London, 1853), and "Eight Years' Wanderings in Ceylon" (1855); Sir James Emerson Tennent's "Ceylon, an Account of the Island, Physical, Historical, and Topographical" (6th ed., 1864), and "Natural History of Ceylon" (1861); and Ransonnnet, "Ceylon" (1868). (See CINGALESE LANGUAGE.)

CEZIMBRA, a seaport of Portugal, province of Estremadura, on the Atlantic, 20 m. S. of Lisbon; pop. about 5,000. There are considerable fisheries here. Under its walls Alfonso Henriquez in 1165 defeated the Moorish king of Badajoz. About 8 m. W. of Cezimbra is the pilgrimage chapel of Nostra Senhora do Cobo, on the crest of Cape Espichel, the Promontorium Barbaricum of the Romans, from which there is a fine view northward of the rock of Lisbon, and southward of the whole of the Arrabida promontory between the mouths of the Tagus and the Sado, and of almost the whole W. coast of Alemtejo.

CHABAS, François Joseph, a French archæologist, born at Briançon in 1817. He early devoted himself to scientific studies, and acquired eminence as one of the highest recent authorities on Egyptology. His first publication appeared in 1856, and his principal works are: *Le papyrus magique Harris* (1861); *Voyage d'un Égyptien en Syrie* (1866); *Les pasteurs en Égypte* (1868); and *Études sur l'antiquité historique* (1872). The last named work embodies his researches undertaken in consequence of the accidental discovery in 1865 of several flint knives in the bed of the Saône, and his subsequent extensive excavations in the same locality. Differing in opinion from most other archæologists, he assigns a historical ex-

istence to many incidents hitherto reputed prehistoric, and avers that science has not yet demonstrated a very high antiquity for man antecedent to the historic period. His work comprises Egyptological speculation up to the present day, and his researches derived from original sources are presented in a series of disquisitions on the chronology, metals, implements, and arms, and on the knowledge of the horse and the camel of the ancient Egyptians. The most suggestive chapter treats of the nations known to the Egyptians, and the book closes with a consideration of so-called prehistoric localities, and with a description of the author's discoveries in the valley of the Saône.

CHABERT, Joseph Bernard, marquis de, a French navigator and astronomer, born in Toulon, Feb. 28, 1723, died in Paris, Dec. 1, 1805. He entered the naval service in 1741, became a member of the French academy in 1758, and in 1781 was made commander of a squadron. He lost his sight through over study in 1800, and in 1804 was appointed a member of the board of longitudes. He was an accurate observer and industrious hydrographer. He planned and executed maps of the shores of North America, the Mediterranean, and especially of Greece. One of his principal works is *Voyages sur les côtes de l'Amérique Septentrionale* (Paris, 1753).

CHABLAIS, a former administrative division of the province of Annecy, Savoy, now forming the arrondissement of Thonon, in the department of Haute-Savoie, France; area, 356 sq. m.; pop. in 1866, 60,193. The Romans raised great numbers of horses in its fine mountain pastures, whence its name Caballica Provincia or Caballicus Ager, corrupted to Chablasium and Chablais. It formed part of the kingdom of Burgundy, and in the 11th century was given by the emperor Conrad to Humbert, first count of Savoy, one of whose descendants became count of Chablais in the 14th century. Under the first French empire it formed part of the department of Leman; in 1814 it was restored to Sardinia, and in 1860 was ceded with the rest of Savoy to France.

CHABLIS. See FRANCE, WINES OF.

CHABOT, François, a French revolutionist, born at Saint Geniez in 1759, died in Paris, April 5, 1794. He was the son of a cook, became a Capuchin friar, was appointed grand vicar of the bishop of Blois, and in 1791 was sent to the legislative assembly. He became conspicuous by his democratic zeal, and declared that "the citizen Jesus Christ was the first *sans-culotte*." Chabot was the first to apply to well dressed young men the name of *muscadins*; in his person and dress he affected great neglect. He was a member of the convention in 1792, and edited the *Journal populaire*. At length, however, he lent himself to the machinations of the enemies of the revolution. An Austrian banker, Junius Frey, one of their most active agents, gained him

over by giving him his sister Leopoldine in marriage, with a dowry of \$40,000. Chabot became implicated in various suspicious operations, and was guillotined.

CHABOT, Philippe de, a French general, born toward the end of the 15th century, died June 1, 1543. Descended from an ancient family of Poitou, he was brought up with Francis I. He bravely defended Marseilles in 1524, and was made prisoner at Pavia in 1525. Appointed admiral immediately after his release, he was sent to Italy in 1529 to negotiate the ratification of the treaty of Cambrai by Charles V. Made commander-in-chief of the forces in Savoy in 1535, he effected the conquest of part of that country and of Piedmont, but was censured for not following up his victory. On his return to France charges of frauds upon the national treasury were brought against him by the constable de Montmorency. Found guilty and imprisoned, he was soon afterward pardoned by the king at the solicitation of the duchess d'Étampes, and reinstated in his position after the disgrace of Montmorency. He is said to have been the first to suggest the project of colonizing Canada. A collection of his letters written in 1525 is in the national library of Paris. A monument, dedicated to him by his son Léonor, is now in the Louvre.

CHABRIAS, an Athenian general, killed in the harbor of Chios in 357 B. C. In 392 he succeeded Iphicrates in the command of the Athenian forces before Corinth, was afterward sent to chastise the Æginetans for depredations on the coast of Attica, and assisted Evagoras in Cyprus, and Acoris in Egypt, against the Persians. In 378 he commanded the army which the Athenians sent to the aid of Thebes against the Lacedæmonians, under Agesilaus, on which occasion he saved his troops from impending defeat by commanding them to await the attack of the enemy with pointed spear and shield, resting on one knee. A statue of him in this position was erected to his honor in Athens. In 376 he won an important victory over the Lacedæmonian fleet off Naxos. A few years later he went on his own account to Egypt, where he commanded the naval forces of Tachos, then in rebellion against the Persians, whose cause, however, after the desertion of the Spartans, he gave up as hopeless. After his return to Athens, he took part in the expedition against Thrace at the outbreak of the social war. At the siege of Chios his vessel was the first to enter the harbor, but becoming isolated and disabled was soon abandoned; he alone refused to save his life, and fell fighting. He was the last of the great Athenian generals. Demosthenes said of him that he conquered 17 cities, took 70 vessels, made 3,000 prisoners, and enriched the treasury of Athens with 110 talents. One of his apophthegms was that an army of stags led by a lion is superior to an army of lions led by a stag. His life was written by Cornelius Nepos.

CHABRILLAN, Céleste Vénard, countess de, a French author, born in Paris, Dec. 27, 1824. Driven from her home by the brutality of her stepfather and the ill treatment of her mother, she became an actress and a circus rider, and was disreputably noted under the name of Mogador. In 1854 she published *Adieux au monde, mémoires de Céleste Mogador* (5 vols.), which was suppressed, as well as the second edition (4 vols., 1858). She married in 1853 the count Lionel de Chabrilan, who became consul at Melbourne. After his death (Dec. 29, 1858) she returned to Paris, and was an actress and manager of the Folies Marigny theatre (1862-74), where some of her plays were performed. She has written several novels, including *Mémoires d'une honnête fille* (1865).

CHABROL DE CROUZOL, André Jean, count, a French statesman, born at Riom, Nov. 16, 1771, died at Chabannes, Aug. 7, 1836. He took orders, and during the French revolution was imprisoned for refusing to preach in favor of the secularization of the clergy. He was set free in 1795, entered political life, and after holding several minor offices was made in 1812 intendant general in the Illyrian provinces. Returning to Paris in 1814, he was appointed councillor of state by Louis XVIII., and in November made prefect of the department of the Rhône, taking up his residence at Lyons. In 1816 he was led into measures of arbitrary severity by the supposed discovery of a conspiracy in the city; and he was recalled by the government, but soon after received the office of under secretary in the ministry of the interior. In 1820 he was elected a deputy from Puy-de-Dôme, and in January, 1821, he was made director of registry and public lands. In 1824 he became a peer of France and was made minister of marine, distinguishing his administration of the office by many useful reforms. He was minister of finance in the cabinet of Polignac in 1829, and retired from political life in May, 1830.

CHACHAPOYAS (sometimes called **SAN JUAN DE LA FRONTERA**), an inland town of Peru, capital of a province of the same name and of the department of Amazonas, 410 m. N. of Lima; lat. 6° 18' S., lon. 77° 25' W.; pop. about 6,000. It is situated on the banks of a river of the same name, a tributary of the Marañon, which waters the province. The surrounding districts produce tobacco and cotton, fruits, the European cereals, vegetables, &c., in abundance; cattle are raised in great numbers; and the people are chiefly occupied in agriculture, and the manufacture of leather, trunks, chairs, cigar cases, &c.

CHACO, El Gran (the Great Chaco), a vast and for the most part unexplored region of South America, extending along the centre of the continent from the left bank of the Río Salado N. to about lat. 20° S., where it is lost in the Chiquito plains in Bolivia; and from the banks of the Paraguay W. to the E. limits of the mountain region of the Argentine Republic.

It thus forms the continuation of the great pampæan plains which begin far south in Patagonia, and reach N. to the Salado. Owing to the nature of its climate and soil, the Chaco is naturally divided into two distinct portions, northern and southern. The northern, watered by plenteous rains and traversed by a river of considerable magnitude, the Pilcomayo, presents the usual features of intertropical countries; it is densely wooded, and clothed in immense tracts with a luxuriant growth of grass, with here and there wide-spreading marshes, which rarely become entirely dry between the periodical floods. Here almost all kinds of spontaneous tropical vegetation are represented. The southern division may be considered as one vast desert, generally unfavorable to vegetable growth, and presenting here and there some rare specimens of dwarfish spiny plants; but the aridity of the soil is due to the lack of moisture so common in all South America below lat. 24° S. and W. of the Plata and Paraguay. This may be overcome by artificial irrigation, and several prosperous colonies have of late years been formed in that region. The whole of the northern portion, which belongs to Bolivia, is, with the exception of a settlement established in 1872 in the N. W. corner of the territory by the Bolivian government, the undisputed home of uncivilized Indians; while the southern, besides the colonies of whites already mentioned, is divided between nomadic and semi-civilized Indians, the latter having abandoned their predatory habits and established themselves by families in determined localities in imitation of the whites. The animal life in the Chaco differs in few respects from that of the neighboring portions of the Argentine and Bolivian republics. Capybaras or carpinchos, and the various other larger mammals, abound on the banks of the rivers; there are numerous species of serpents and hideous venomous spiders of immense size; and myriads of small birds of endlessly varying plumage enliven the forests.

CHÆRONEA, a town of Bœotia, on the Thermodon, a small tributary of the Cephissus, near the frontier of Phocis, renowned for the battle in which Philip of Macedon defeated the Athenians, Corinthians, and Thebans in 338 B. C. This victory was largely due to Alexander, then a youth of 18, who commanded the left wing of his father's army, and broke the sacred band of the Thebans by the weight of the Macedonian phalanx. It made Philip master of Greece. The Athenians lost 1,000 killed and several thousand prisoners. Another battle was fought here in 86 B. C., and won by Sulla over the army of Mithridates, king of Pontus, under Archelaus. Some remnants of the ancient town are still visible at the village of Capurna, such as a theatre on the mound of the slaughtered Thebans, an aqueduct, and a broken marble lion, undoubtedly that mentioned by the historian Pausanias as having been placed above the grave of the Theban dead.—Charonea

was the birthplace of Plutarch, and the last years of his life were spent there.

CHÆTODON, a genus of spiny-rayed fishes, with compressed and scaly body, so named from their closely set rows of bristle-like teeth. The family to which they belong was formerly called *squammipennes* from the scaly character of the dorsal and anal fins; the mouth is small. They abound in tropical waters, on rocky shores, and are of brilliant colors, black, blue, green, and yellow being the



Chætodon rostratus.

prevailing hues; their flesh is good eating. In this genus, of a family containing nearly 20 genera and 150 species, the *C. rostratus* (Bl.), of Java, is remarkable for its faculty of ejecting drops of water from its elongated snout, so as to hit insects on the plants growing in the water and thus secure them as food; this it does with great precision. It is of a silvery hue, with five brownish bands.

CHAFFINCH (*fringilla caelebs*, Linn.), one of the most common and most beautiful of the passerine family of birds, a native of Europe. The color of the bill varies according to the season from a blue to a pale reddish brown; the eyes are hazel; the forehead black; upper part of the head and hind neck grayish blue; back reddish brown; fore neck and breast purplish red or dull pink; rump yellowish green; the larger wing coverts black, the secondary tipped with white, the smaller black and grayish with white spots; the quill feathers white at the base and along the inner margin; the tail brownish black, the exterior feather obliquely marked with white, including the middle of the outer web and the terminal third of the inner, the next slightly margined with white internally, and tipped with the same on the inner web; the middle feathers brownish gray, blackish along the shafts. The female has the upper part of the head and the back light grayish brown; the rump yellowish gray. Young like the female,

with the tail paler. The variations from these colors are slight, though the tips of the feathers become considerably worn, giving a brighter appearance to the plumage of the head, back,



Chaffinch (*Fringilla coelebs*).

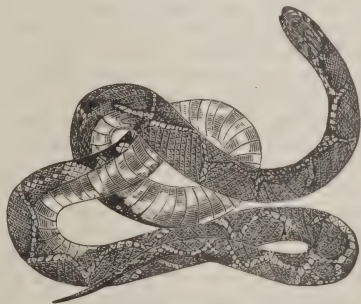
and breast. Length of the male $6\frac{1}{2}$ inches; extent of wings $11\frac{1}{2}$ inches; bill $\frac{1}{2}$ inch; tarsus $\frac{3}{4}$ inch; the female is a trifle smaller. It is a permanent resident in Great Britain, though in corresponding latitudes on the continent it migrates southward. Its notes are monotonous, generally *twink, twink*, repeated three or four times; hence its provincial name of *twink*; it is almost constantly heard in the lanes and gardens from May 1 to the middle of June. In summer they live chiefly on insects, with which they feed their young; in winter they become gregarious and frequent the fields, farm yards, and roads in search of seeds and grain, to aid the digestion of which they swallow smooth particles of gravel. Their flight is rapid, with frequent undulations; on the ground they move with short leaps. The nest is neatly constructed of moss, lichens, wool, feathers, and hair, and is generally of such a gray color as to be seen with difficulty in the cleft of the lichen-covered trees. The eggs are four or five in number, about three fourths of an inch long, of a purplish white or pale reddish gray color, with a few spots and lines of reddish brown. The chaffinch is one of the most familiar birds, and, with the sparrows and buntings, in the winter will come in flocks around the doors of the farm houses. They prepare to breed in April, and hatch their first brood by the middle of May, and a second by the end of July. They are much esteemed in Germany as song birds, and are occasionally seen as parlor ornaments elsewhere.

CHAGRES, a river of the United States of Colombia, rising in the mountains about 40 m. N. E. of Panama. It flows first W., then curves abruptly to the N. W., and falls into the Caribbean sea at the town of the same name, which it intersects. Its whole course is about 120 m., through a country of remarkable fertility; its principal tributary is the Trinidad, and there are one or two others of inconsiderable magnitude; and its depth from the junction of the Trinidad gradually

increases from 16 to 30 ft., until it reaches the town of Chagres, a distance of less than 10 m. The swiftness of its current and a number of rapids impede navigation.

CHAGRES, a seaport town of the United States of Colombia, in the state and on the isthmus of Panama, and at the mouth of the above described river, on the Caribbean sea, 12 m. S. W. of Aspinwall; lat. $9^{\circ} 18' 30''$ N., lon. $79^{\circ} 60'$ W. This place has rapidly fallen into decay since the opening of the Panama railway, the northern terminus of which is at Aspinwall. It is divided by the river into two parts. That on the left bank consists of a number of wooden houses irregularly huddled together, and, having formerly been almost exclusively inhabited by citizens of the United States, is generally denominated the American town; that on the right bank is an agglomeration of miserable huts, in the centre of which is a dilapidated church. The port is very safe and commodious, and defended by a stone fort upon a rock; but it has not more than about two fathoms of water, and the entrance is so narrow that it cannot be successfully approached without a fair wind.

CHAIN SNAKE (*Coronella getula*, Linn.; genus *ophiobolus*, Bd. and Gd.), an American species, first described by Catesby under this name; it is also called thunder snake, and king snake. It has been arranged under different genera, but the above is the name given to it by Dr. Holbrook. The head is small, short, and rounded at the snout; the nostrils are large, and open laterally; the eyes small, and the iris dusky; the neck is very little contracted, and is covered above with small smooth scales; the body is elongated, stout, with large, smooth, six-sided scales above, and large plates below; the tail is quite short, thick, and soon tapers to a horny point. The colors of this handsome snake are singularly arranged; the groundwork of the whole upper surface is a rich shining black, all the plates about the head being marked with one or more white spots;



Chain Snake.

the chin and throat are white, most of the plates being margined with black; on the body are about 22 transverse narrow white bars, embracing two or parts of three scales,

bifurcating on the sides, one branch going to the ring in front, the other to the ring behind, causing a nearly continuous waving white line on the sides from the neck to the vent; alternating with the dorsal bars there are irregular white blotches reaching to the abdomen, which is shining violet black; the tail has four or five transverse rings. The abdominal plates are about 215 in number, and the bifid subcaudal scales from 40 to 50. In a specimen 42 inches long, the head measures a little over an inch, the body 36 inches, and the tail 5 inches; they attain the length of more than 4 feet. Though fond of moist and shady places, it does not take to the water or to trees; it feeds on moles, mice, small birds, and reptiles, and even other snakes. It is found from New York to Florida; its western limit is not positively known.

CHAIX D'EST-ANGE, *Gustave Louis Adolphe Victor Charles*, a French advocate, born in Rheims, April 11, 1800, died Dec. 14, 1876. An able defence of the political conspirators of 1820 and 1821 gained for him early popularity. He afterward distinguished himself in criminal trials, where he was considered as almost without a rival. Elected deputy by his native city in 1831, he took his seat among the moderate members of the opposition, and gave peculiar attention to the questions of copyright and individual liberty. One of the interesting trials in which he was engaged in 1832 was in reference to Victor Hugo's drama, *Le roi s'amuse*, when he was employed by the government to sustain the suppression of the drama, and in which he had the author himself and Odilon Barrot as adversaries. A member of the constituent assembly in 1848, he evinced great zeal in his opposition to the doctrines of the socialists, with a leaning to the Bonapartists. His sympathies were rewarded in 1857 by the place of attorney general to the imperial court of justice, in which capacity he appeared as prosecutor against the Italians implicated in the attempt of Jan. 14, 1858, upon Napoleon III. Soon afterward he was made councillor of state, and became a senator in 1862, and vice president of council Oct. 18, 1863.

CHALCEDON, an ancient town of Asia Minor, on the Bosphorus, opposite Constantinople, and near the modern town of Scutari. It was founded by a colony from Megara about 680 B. C., who were ridiculed as blind by the ancients because they settled here and overlooked the admirable site directly opposite, where Byzantium was founded about 20 years later. For this reason Chalcedon was often called the city of the blind. About 506, in the reign of Darius, it was taken by the Persians, then by the Athenians and Lacedæmonians, and after a period of independence fell under the dominion of the kings of Bithynia. The Romans got possession of it in 74 B. C. Its walls were destroyed by Valens, and it is now but a poor village called Kadi-kei.—In ecclesiastical history Chalcedon is celebrated as the seat of the

fourth œcumenical council, convoked in 451, at the request of the patriarch of Constantinople, Flavian, by the emperor Marcian, to condemn the heresy of Eutyches concerning the two natures of Christ, and to counteract the effect of the unauthorized assembly held at Ephesus in 449, and generally stigmatized as the robber synod. The council met on Oct. 8, and 630 bishops, chiefly from the East, were present. Pope Leo I. presided by his legates. The creeds of Nice and Constantinople were adopted as the rule of faith; and after a prolonged discussion the *latrocinium* of the Ephesian assembly, as well as the doctrines of Eutyches and Dioscorus, in favor of which that synod had pronounced, was condemned. The bishops professed their belief in the existence of two natures in Christ, and declared the Virgin Mary truly the mother of God, directing their decree against both Nestorian and Monophysite doctrines. Fifteen sessions were held, in which 30 disciplinary canons were promulgated, among which was the celebrated decree, opposed by the Roman legates, which made the see of Constantinople equal in privileges and jurisdiction, and next in rank, to that of Rome. It was also ordered that no bishop should take money for ordination, that no ecclesiastic should undertake the administration of the temporal matters of the church or of widows and orphans, forsake the church for any other office, go before a lay tribunal, or hold more than one benefice. Bishops were forbidden to divide their provinces, and were given control over the clergy in monasteries. Deaconesses were forbidden to be appointed under the age of 40. Differences were adjusted between the sees of Antioch and Jerusalem, Nicomedia and Nice; and Theodoret, deposed in consequence of a decree of the assembly of Ephesus, was restored to his bishopric. These decrees were confirmed by Leo, with the exception of the one relating to the see of Constantinople; and throughout the Latin church the council of Chalcedon has always been venerated.

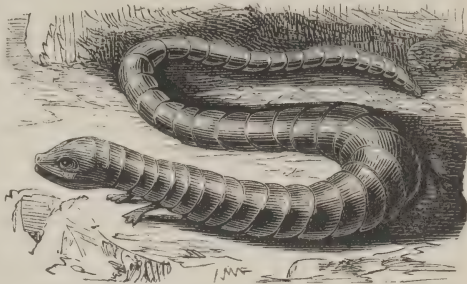
CHALCEDONY (from the city of Chalcedon), one of the numerous varieties of the quartz family, which are distinguished from each other, not by difference of chemical composition, but by their external form, markings, and colors. The peculiarities of chalcedony consist principally in its mammillary, botryoidal, and stalactitic shapes, and its waxy or horny lustre and texture. It is found lining cavities in trap, and also in other rocks, being arranged in concentric layers, precisely as if its particles had been introduced in a gaseous or fluid form. The intermixture of coal with the purely silicious layers suggests that water was present during the production of the mineral incrustation. By the variety of its colors and the high lustre it acquires by polishing, chalcedony is much esteemed as an ornamental stone, though its great hardness renders it very difficult to work. In several of the countries of Asia it is common to find articles of this stone, as cups,

plates, &c., of the most exquisite workmanship, as delicate as the finest chinaware. Specimens of the finest texture and most delicate shades are selected for these, especially such as are more or less white, passing into transparent and brown. At Oberstein, in Germany, chalcedony is worked like agate. (See AGATE.) Some of the finest known specimens of chalcedony were found at the Tresavean copper mine in Cornwall. They occurred in a single pocket or cavity in the mine, and none others were found like them. One of them, described as resembling the anatomized wing of a large bat, displaying its bones and arteries, is preserved in the British museum. The mineral is frequently met with in the United States, and is particularly abundant where metallic veins are worked, but no specimens of extraordinary beauty are found. It also occurs in Nova Scotia and Iceland.

CHALCHIHUITL, the Indian name of a green-colored stone, held in high repute by the ancient Mexicans, and by the Indian tribes now inhabiting the northern and western portions of New Mexico. They possess the art of fashioning it into ornaments, as beads and other trinkets, and occasionally use it in trade, valuing it more highly than gold. It proves, according to the researches of Mr. W. P. Blake, to be turquoise. The locality, at which it has been obtained from remote periods, is in the mountains called Los Cerrillos, 20 m. S. E. from Santa Fé. A quarry of extraordinary extent has been excavated in a granular light-colored porphyry; and around it are a number of smaller excavations. Mr. Blake describes the great pit as appearing, from the top of the cliff, "200 feet in depth, and 300 or more in width." Pine trees more than 100 years old are growing upon the débris in the bottom and about the sides. These excavations were evidently made before the conquest of the country by the Spaniards, though the Indians still continue to visit the locality to search among the débris for more crystals. The earliest historians, as Bernal Diaz, who accompanied Cortes, and others, make mention of chalchihuitls among the presents made by Montezuma, intended especially for the Spanish sovereign. Mr. Blake proposes that the name be retained by mineralogists for this New Mexican variety of turquoise. The Indian pronunciation of it is chal-che-we-te. Prof. Pumpelly thinks the *feitsui* and *jade* of the Chinese is the same as the *chalchihuitl* of the ancient Mexicans.

CHALCIDIANs, a family of snake-like lizards, whose scales are rectangular as in ordinary reptiles, and arranged in regular transverse rows; they lead on the one hand to the skinks, and on the other to the long, serpentiform lizards, like the glass snake, blindworm, and amphibæna. They have four legs, often very rudimentary, and always small and feeble, with one to four or five toes; the eyes are small, with lids, ears exposed, and tongue short and fleshy. They are found in the warmer parts

of South America, Africa, and the East Indies. By the older naturalists they were regarded as



Brazen Lizard (*Chalcis flavescens*).

snakes, to which they form a natural transition. Their food consists of small insects; they are perfectly harmless.

CHALCIDICE, the ancient name of the peninsula forming the S. E. portion of Macedonia, and terminating in the three smaller peninsulas of Acte, Sithonia, and Pallene, extending into the Ægean sea. Its eastern extremity is Mt. Athos. Generally hilly and rugged, Chalcidice was more celebrated for the ability and energy of its inhabitants than for its productions or natural features. Settled by colonists from Eubœa about the 7th century B. C., the country maintained its independence until after the Peloponnesian war, when it was subdued by the Spartans. Its subsequent history may be found in that of its chief town, Olynthus.

CHALCIDIUS, a Platonic philosopher, supposed to have flourished in the 5th or 6th century. He is described upon the manuscripts of his work as *vir clarissimus*, and these vague words are the only allusions which we have to his life. There remains from him a Latin translation of the first part of the "Timæus" of Plato, with a learned commentary. This work is dedicated to a certain Osius, who has been by some regarded, but without any evidence, as the archbishop Osius who took a leading part in the debates of the council of Nice in 325. Giraldi and Brucker have maintained that Chalcidius was a Christian, Goujet and Mosheim that he was a pagan. The last and best edition of his commentary is that of Fabricius, at the end of the second volume of the works of St. Hippolytus (Hamburg, 1718).

CHALCIS, *Evripo*, *Egripo*, or *Negropont*, the principal town of the island of Eubœa, in Greece, 34 m. N. by W. of Athens; pop. about 6,000. It is the seat of a Greek archbishop, and is said to be the only town of Greece in which any Mohammedan families remain. The city and fortress, which was one of the strongest and most important of ancient Greece, are situated at the narrowest part of the strait of Euripus (*Evripo*) separating the island from Bœotia. The strait here is narrowed by a projecting spur of the mountain of Karababa on the mainland, and the corresponding protrusion of a rocky promontory on the island

side. Over against Chalcis, at about 3 m. distance, is a steep craggy promontory on the mainland, considerably S. of the strait. This is undoubtedly the "rocky Aulis," on which was pitched the camp of Agamemnon when his fleet was wind-bound through the wrath of Diana. This promontory separates two rocky inlets; one is of small size and inconsiderable depth of water; the other is much larger, and is still called Vathy, the modern corruption for *βαθὺς λιμὴν*, the deep harbor, in which lay moored the Grecian fleet. The strait is divided by a rocky islet, which is connected with the mainland by a stone bridge, 70 ft. long, and with Eubœa by a wooden bridge, with draws at each end for the passage of vessels. There are no vestiges of ancient Chalcis, except a few fragments of white marble in the walls of mosques and houses, and the bust of a statue in the wall of a house in the fortress. Many of the better houses are of Venetian construction, and there is a church with a high pointed roof, a square tower, and Gothic windows, which was probably built by the same people. Chalcis was a flourishing town in remote antiquity. It planted colonies in Italy, Sicily, and chiefly in the Macedonian peninsula between the Strymonic and Thermaic gulfs, which from its Eubœan settlements received the name of Chalcidice. On account of its situation it was important in the Grecian wars, and it largely figures in them. The Venetians took it from the Byzantine empire in 1205, and the Turks from them, under the conqueror of Constantinople. Aristotle died here.

CHALCONDYLES, or *Chalcocondyles*. **I. Laonicus** or *Nicolaus*, a Byzantine historian, born in Athens near the end of the 14th century, died about 1464. He was present at the siege of Constantinople, and wrote a history of the Turks and the fall of the Byzantine empire, which is quoted by Gibbon. The best Greek edition was published in 1650, and a French translation by Blaise de Vignères (1557-'84). **II. Demetrius**, a Greek scholar, a relative, some say a son, of the preceding, born in Athens about 1423, died in Milan about 1510. He taught Greek at Perugia, and was afterward appointed professor at Florence, where he remained till 1492, when he removed to Milan. He prepared the first printed editions of Homer (Florence, 1488), of Isocrates (Milan, 1493), and of Suidas (1499); and composed a Greek grammar, *Erotemata* (Milan, 1493).

CHALDEA, properly the name of the S. W. part of ancient Babylonia, bordering on the N. E. confines of Arabia. So it is mentioned by Ptolemy the geographer. Strabo also speaks of a Chaldean tribe living in that region. This district comprised the most fertile plains of Babylonia, made wonderfully productive by the numberless canals constructed by the rulers of that empire for defence, commerce, and irrigation. But commonly the name is applied to Babylonia in general, designating the whole of the province, sometimes even the empire of

that name. The Hebrew term, probably for all these meanings, is Chasdim, or land of the Chasdim (Chaldees). The latter first appear in the Scriptures as the owners of the region which was the abode of the ancestors of Abraham, then as a conquering tribe and nation, and besides as a caste of priests or astrologists. The Ur Chasdim (Ur of the Chaldees) of Abraham was considered by many modern critics to have been a place in Mesopotamia, and identical with the castle of the same name, mentioned by Ammianus as situated between Nisibis and the Tigris. This, as well as the circumstance that Chaldeans are mentioned by Herodotus as soldiers in the Assyrian army of Xerxes, and by Xenophon, in the history of the retreat of the ten thousand, as a free and warlike people in the Carduchian mountains, made it appear probable that the original home of this nation was among, or at least near, the mountains of Armenia, whence they made their incursions, it was supposed at different periods, into the neighboring southern countries, subduing Babylon, and afterward Syria. Gesenius supposed their name to have been originally Card, which was changed into Chas and Chald, and preserved in that of the modern Kurds, inhabiting the region of the ancient Carduchi. Their Semitic descent seemed to be proved by the language called after them; so Josephus represents them as descendants of Arphaxad, son of Shem, the latter part of that compound name supporting his opinion. But there remained considerable difficulties in critically establishing the early history of this nation. Nimrod, the mighty hunter, who is mentioned in the book of Genesis as the founder of the empire of Babylonia, which is afterward styled the land of the Chaldees, was a Hamite, and seems to have extended his conquest northward, at least according to an almost generally adopted explanation of the passage which speaks of him. The Greeks name Belus as the founder of the same empire. Nothing is said in the Bible about the nation to which belonged Amraphel, the king of Shinar, that is, Babylonia, who fought a battle in Palestine in the days of Abraham; and a chasm of about 13 centuries separates the first mention of the Chaldeans, in connection with the Ur of the ancestors of the patriarch, from their next re-appearance in the Scriptural history, in the time of Isaiah (except their being mentioned in the book of Job as capturing the camels of the patriarch of Uz); while Babylonia, which appears first at the same time in relation with the history of the Hebrews, is known from the testimony of the classical writers to have existed during this whole period as a highly developed state, by turns conquering and conquered, a product of its advanced industry being also mentioned in the history of Joshua. A natural consequence of these dates would therefore have been the conclusion that Babylonia, having been founded by Nimrod or Belus, be these names identical or not, had reached a

high degree of culture, might, and glory before it was conquered by the warlike tribe who made Babylon the centre of greater conquests, power, and civilization, "the beauty of the Chaldees' excellency," as it is called in Scripture, the *Chaldaicarum gentium caput*, as Pliny calls it. Thus the history of this nation, as masters of Babylonia, would be dated either from the year 747 B. C., the first of the so-called Chaldean era of Nabonassar in the astronomical canon of Ptolemy, who makes him the first of a series of 19 princes of this nation who ruled the great city after the fall of the first Assyrian empire; or from the reign of Nabopolassar, who in alliance with Cyaxares, king of the Medes, broke the yoke and conquered the capital of the Assyrian state, thus founding the independence of Babylonia, and its predominance in western Asia, which his son Nebuchadnezzar so vastly extended. But this conclusion is weakened by the circumstance that Babylon is known to have been already in the most remote periods of history the seat of a system of religious worship and science, which in antiquity was generally attributed to the genius and made the glory of the Chaldeans, whose name both in Biblical and classical antiquity designates not only the nation, but also the peculiar priest caste devoted to the sacred science of astrology; it being also mentioned that Callisthenes, who accompanied Alexander on his expedition to Persia, sent Aristotle a collection of astronomical observations made by the Chaldeans in the temple of Belus, their observatory, during a period of no less than 1,903 years. It is moreover shaken by the contents of the fragments of the Babylonian historian Berosus, which though full of extravagant legends, at least prove a very ancient belief that the Chaldeans were the earliest or among the earliest organizers of Babylonian society. Berosus speaks of an antediluvian dynasty of Chaldean kings, during the early time of which Oannes, an extraordinary being, half man, half fish, speaking with a human voice, came out of the waves of the Erythræan sea to teach the inhabitants of the shore religion and laws, science, art, and industry, retiring every evening into the sea and reappearing every morning. He and his successors became the civilizers of the people of Babylonia. Some critics have seen in this myth of Oannes a confirmation of a relation of Diodorus, according to which a colony from Egypt headed by Belus, the son of Poseidon and Libya, carried the science of their land over the sea to the inhabitants of the Babylonian plains, which served to vindicate the claims of the Egyptians for the priority of their astronomical knowledge over that of their great Asiatic rivals; while others regarded the Chaldeans as the fathers of astronomy, and their country as the focus of this science, whence it spread to India, Egypt, and the West. The third dynasty of the postdiluvian kings of Berosus is also Chaldean. The most plausible way of reconciling the discrepancies

in the testimony of the ancients seemed to the critics of the school of Gesenius, whose dissertation on the Chaldeans in the *Encyclopædie* of Ersch and Gruber was long regarded as the best solution, to be to sum up the history of the Chaldeans as follows: Their first home is either in the mountains of Armenia, or somewhat further N. in those of the Caucasus, or further S. in those of Kurdistan; their Scriptural ancestor being either Arphaxad, son of Shem, or Chesed, son of Nahor, likewise a Shemite. They spread over Mesopotamia and made incursions into Babylonia. A colony of them, soon after the foundation of Babylon, establishes the influence of their priest caste in that state. Like the Brahmins of India, they rule the public worship, and through it the laws and manners of the Babylonians. They develop art, industry, and commerce, but above all the science of astronomy and astrology. They occupy the highest rank in the state, and its governors or viceroys in the period of subjection to Assyria are chosen from their body, of which is also Nabonassar, who heads the series of Ptolemy's 19 Chaldean princes, probably vassals of the Assyrian empire. One of these princes is Merodach-baldan (mentioned also under this name by Berosus, and under that of Mardokempad by Ptolemy), who in the time of Sennacherib sends ambassadors to Hezekiah, king of Judah, probably with the object of forming an alliance against the common oppressor. His successor, Belibus, is carried away as captive by Sennacherib, who makes his own son Esarhaddon (the Asardon of Berosus) viceroy of Babylonia. In the mean time the stock of the Chaldean nation remains in their native mountains, warlike, fierce, and predatory. They appear as plundering invaders in the book of Job, and at a later period as Persian soldiers in the history of Herodotus, and as a warlike mountain tribe in Xenophon's *Anabasis*. Strengthened by new immigrations of this warlike people, Nabopolassar, the Chaldean viceroy of Babylonia, shakes off the yoke of New Assyria, destroys Nineveh with Cyaxares, and thus becomes the founder of the Chaldean empire, now properly so called. Its limits, power, and glory are vastly extended by his son Nebuchadnezzar, who leads his fierce armies and the hosts of his vassals as far as Egypt, or, according to the legend, as far as the pillars of Hercules, peoples his provinces with nations carried into captivity, and adorns his enlarged capital with the treasures of destroyed cities and sanctuaries, with palaces, temples, and magnificent gardens. The Chaldeans are now the nation of Babylonia, though their priests appear also under this name as a caste, or at least as a numerous college, similar to that of the magi of the Medes, devoted to the science of the stars and to the religious practices connected with it. Through Nebuchadnezzar's conquests Babylon is made "the mistress of kingdoms," who says in her heart, "I am, and there is nothing else beside

me." But half a century later "the golden city," enervated by luxury and extravagance, becomes an easy prey to the warlike Medes, "who do not regard silver, nor delight in gold." The "bitter and hasty" nation of the Chaldeans disappears as such, and its name is preserved for some time only in scattered tribes, and its glory in the science of its priests. The determination of the lunar periods, that of the equinoctial and solstitial points, a more precise definition of the solar year, the division of the ecliptic into 12 equal parts, that of the day into hours, the signs, names, and figures of the zodiac, the invention of the dial, are some of the improvements in astronomy attributed to the knowledge of the Chaldeans. With the decline of Babylon their science sinks, and the Chaldeans are afterward known among Greeks and Romans only as astrologers, magicians, and soothsayers, and as such despised, and finally persecuted by some of the emperors.—This scheme of Chaldean history, as far as it relates to the northern origin of the people, is invalidated, though not overthrown, by the results of the archæological researches based on the recent discoveries among the ruins of Babylonia and Assyria. (See CUNEIFORM INSCRIPTIONS.) The main points of these results may be briefly summed up as follows: About the year 2234 B. C. the Cushite inhabitants of southern Babylonia, probably a people identical with the Kaldi mentioned in Assyrian inscriptions of much later date, and of a cognate race with the primitive settlers both of Arabia and of Ethiopia, are supposed to have first risen into importance. Delivered from the yoke of the Medes, whose reign is mentioned by Berosus as that of the first postdiluvian dynasty, they established a native dynasty, founding an empire, whose earliest capitals (the southern or lower tetrapolis) were Hur or Huruk, supposed to be the Scriptural Ur, now Mugheir; Erech, now Warka, or Urka, the great necropolis of Babylonia; Larsa, the Scriptural Ellasar, now Senkereh; and Nipur (perhaps identical with the Scriptural Calneh), the city of Belus, now Niffer. Another tetrapolis, in the northwest, is supposed to have been formed by Babel, Borsippa, Cutha, and Sippara. The city which the oldest inscriptions seem to mark as the Cushite capital is Hur, the southernmost of all, a little below 31° N. lat., near the W. bank of the Euphrates. Its site is presumed to have been originally on the shore of the Persian gulf, which subsequently receded. These Cushites introduced the worship of the heavenly bodies in place of the elemental religion of the magian Medes. In connection with this planetary adoration, whereof the earliest traces appear in the temples of the moon at Mugheir, of the sun at Senkereh, and of Bel and Beltis (or Jupiter and Venus) at Niffer and Warka, the movements of the stars were observed and registered, astronomical tables formed, and a chronological system founded thereupon, such as continued uninterrupted to the days of Cal-

listhenes and Berosus. To this primitive Cushite dynasty, which is probably represented in the Bible by Nimrod, the son of Cush, the two earliest of the monumental kings, Uruk or Urkham and his son Ilgi, may be assigned. The former, whose seal cylinder is preserved, is described on the monuments as king of Hur and Kingi-Akkad (the Scriptural Accad). The next names on the monuments, in point of antiquity, are Sintishil-Hak and his son Kudur-mabuk or Kudur-mapula. This latter king is designated as the "ravager of the west," and may easily be identified with the Scriptural Chedorlaomer, king of Elam, or Susiana, a country inhabited by a Cushite race; and it is presumed that at this period the Elymæans stood at the head of a confederacy of Cushites, Semites, Aryans, and Turanians, of whom Chedorlaomer, Amraphel, king of Shinar or Babylonia proper, Arioch, king of Ellasar, and Tidal, king of various Turanian "nations," were the respective national chiefs. This combination of races probably gave rise to the name Kiprath-arbat (four tongues), given to the Babylonian people in the inscriptions. Under the Elymæan dynasty, which corresponds to the second postdiluvian Chaldean of Berosus (1976–1518 B. C.), the seat of power was removed northward to the upper tetrapolis, while on the Tigris were laid the foundations of the Semitic realm of Assyria. Several names of the Elymæan dynasty have been recovered from the monuments, among them that of Khammarubi, the builder of temples and constructor of the old royal canal, who gathered the people of "Sumir and Akkad," supposed to have been the chief races of Babylonia, into cities. The following dynasty is designated in Berosus as the Arabian (1518–1273 B. C.). It indicates the overthrow of the Cushite ("Chaldean") ascendancy by a new Semitic conquest or revolution, the origin and character of which are still matters of speculation. The end of this Arab dynasty is followed by the rise of the Assyrian power, with which Babylon long contended for independence and supremacy, until she recovered both under the properly Chaldean dynasty of Nabopolassar. This dynasty is believed to have reestablished the predominance of the southern tribes of Babylonia, while the Semitic languages of Babylonia and Assyria remained the prevailing languages of the empire. (See ASSYRIA, BABYLON, BABYLONIA, CUNEIFORM INSCRIPTIONS, and the authorities referred to under those heads.)

CHALDEE LANGUAGE, the eastern dialect of the Aramaic, of which the Syriac is the western, and which forms the northern branch of the Semitic tongues, the Hebrew, the Arabic, and some other minor dialects forming the southern branch. As the language or one of the languages of Babylonia in the time of its national greatness, whence it was brought by the Jews after their captivity to Palestine, it is also called Babylonian. The Chaldee is known to us only through the writings of Jews, every

other trace of national literature in this language, if there was any such, having disappeared, while of the kindred Assyrian tongue only scanty inscriptions have been preserved. The history of the Babylonian priest Berosus, of which fragments have been saved, was originally written in Greek. Besides a few words in Genesis (xxx. 47) and Jeremiah (x. 11), we have in the Hebrew canon several chapters of Daniel (from ii. 4 to vii. 28) and Ezra (from iv. 8 to vi. 18, and vii. from 12 to 26) written in this language; and of works of later Jewish writers, the different Chaldaic translations and paraphrases (*Targumim*) of various parts of the Bible, the two Talmuds, and some more modern productions. The apocryphal books of Tobit, Judith, and Maccabees, as well as the history of the Jewish war by Josephus, are also supposed to have been originally written in Chaldaic, this idiom having become by degrees the common language of the Jews after the Babylonish captivity, and particularly from the times of the Maccabees. Of the Targums, that attributed to Onkelos, a strict translation of the Pentateuch, is distinguished by the purity of its idiom, surpassing that of the Biblical fragments: that of Jonathan ben Uzziel, a paraphrase of the historic and prophetic books, and the Pseudo-Jonathan and Hierosolymitan paraphrases of the Pentateuch, are less pure and valuable. (See TARGUMS.) Of the Talmuds only the Gemaras or the commentaries are composed in a Chaldaic idiom, which is greatly corrupt, chiefly in that of Jerusalem, and requires a particular study; while the shorter and older Mishnah, or the text, is Hebrew, though with Aramaic features. After the conquest of Babylonia by the Arabs in the year 640, the use of the Chaldee language gradually ceased; and it is now spoken only in a few mostly Christian communities in the mountains of Kurdistan. As a dialect it is distinguished from the Syriac by its avoiding diphthongs and the vowel *o*, for which it generally has *ā*, by the use of *dagesh forte*, as well as by generally accenting the last syllable, and a less defective writing; from the Hebrew, with which it has a common alphabet, by broadness, by substituting labial for hissing sounds, *š* for *ś* and *ś*, *š* for *ś*, and by comparative poverty in vowels. In forms it is poorer than both the Hebrew and Syriac. To the best grammars of this language belong those of Buxtorf, Michaelis, Harris ("Elements of the Chaldaic Language," London, 1822), Fürst (Leipsic, 1835), Petermann (1841), Winer (Leipsic, 1842), and Bertheau (Göttingen, 1843). The great dictionary of Nathan ben Jehiel of Rome (of the 11th century), entitled *Arukh*, and enriched with additions by Mussaphiah, has been published in a more modern form by Landau (5 vols., Prague, 1819 *et seq.*). Buxtorf's *Lexicon Chaldaicum, Talmudicum et Rabbinicum* (Basel, 1640), is founded upon it. Luzzatto's *Oheb-Geir*, Geiger's *Lehr- und Lesebuch zur Sprache der Mischna* (Breslau, 1845), and J. Levy's *Chal-*

däisches Wörterbuch über die Targumim (Leipsic, 1866-'8) are valuable contributions.

CHALEURS, Bay of (so called from the great heat of the weather when it was first visited by Jacques Cartier, the discoverer of Canada), a wide inlet of the gulf of St. Lawrence, which separates the province of Quebec from that of New Brunswick. It receives the waters of the Restigouche river, which have their source in the mountainous regions of Gaspé, of the Caraquet, the Bass, the Jaquette, the Benjamin, Tête à Gauche, Branche Sud, and Charlot. Here mackerel fishers are attracted in autumn, when that fish arrives in the course of its migrations. It has been a matter of dispute whether this is a bay in the sense of the term intended by the convention of 1818 between England and the United States, and whether the fishermen of the latter country, prior to the treaty of Washington, could be excluded from it. The doubt arose from its extent, 12 to 20 m. in width and 90 in length. Though there are some shallows at the entrance of one or two harbors, the bay affords safe navigation and secure anchorage. In 1760 a French fleet was defeated here by the British.

CHALICE (Lat. *calix*, a cup), the vessel containing the consecrated wine in the sacrament of the eucharist. In honor of its sacred purpose, it has usually been made of as costly a substance as the circumstances of a church permitted, and often embellished with sculptures and precious stones. St. Ambrose relates that in periods of distress the early Christians sold their chalices to aid the poor.

CHALK, an earthy mineral, consisting of carbonate of lime of friable texture, easily rubbed to a white powder. It constitutes rock formations of vast extent, being seen along the shores of the North sea and the English channel, in England and France, towering up in cliffs sometimes 1,000 ft. high, that dazzle the eye with their brilliant whiteness. The rock formation of which chalk is the principal member, and which is called the cretaceous or chalk formation, is the upper group of the secondary series. It is traced across the continent of Europe from the north of Ireland toward the southeast to the Crimea, and from the south of Sweden to beyond Bordeaux, occurring in patches over the greater part of the included area. It gives to the topography an interesting variety of abrupt cliffs upon the coasts and rivers, and of bold hills in the interior, intersected in every direction with valleys of smooth and flowing outline; but the soil it produces is in general too calcareous to be very productive. A remarkable feature in the chalk formation in some localities is the occurrence of layers of flint nodules in the rock, horizontally arranged, and not in contact with each other, and of all shapes and sizes, varying from an inch to a yard in circumference. The flints frequently appear to be concretions of silicious matter around organic substances, as parts of

shells, sponges, &c., into the most minute pores of which the silica has penetrated, beautifully preserving their peculiar forms. The chalk itself is in great part composed of finely committed shells and corals, and it is now generally understood to have been derived from the same sources as the fine white calcareous mud which fills the bottoms of coral lagoons, and the interstices of its structures. This proves to be entirely of animal origin, in part finely ground shells and corals, and partly the excrement of shell fish, and of certain gregarious fishes, which in the coral regions of the Pacific were seen by Darwin through the clear waters, browsing quietly in great numbers upon living corals, like grazing herds of graminivorous quadrupeds. In the coral reefs of the south seas Prof. Dana found portions of these as compact and solid as any secondary limestone, and parts of the still growing structures not to be distinguished from portions of the chalk rocks of the cretaceous formation. The fossils of this geological group are all of oceanic families, but of extinct species. Several species found in New Jersey are identical with those of the same formation in Europe; but the chalk is absent, though the other strata of limestone and greensand are recognized as those which elsewhere accompany it.—Chalk is employed for a variety of purposes. It is easily converted into lime, in which state it forms a valuable fertilizer as well as cement. It is used as a marking material, and also for polishing metals and glass. When finely ground, and purified by washing and separating its harder particles, it is sold by the name of whiting, or Spanish white. The flints found in the formation were once much used in England in the manufacture of glass.—In medicine, chalk, when thoroughly purified, is used, under the name of prepared chalk, as an absorbent in diarrhoea; it is also an antacid, and is used to furnish carbonic acid gas; it is also a dentifrice. Chalk mixture is the form in which prepared chalk is commonly administered medicinally. When diarrhoea depends upon irritation or inflammation of the mucous membrane of the bowels, it should not be employed, for it is then more likely to increase than allay the disturbance. It may often be advantageously combined with opium or astringents, or both.—French chalk is a pure variety of steatite or talc, used by tailors for marking cloth, and also mixed with cosmetics to give them body. Black chalk is a variety of bituminous shale, made use of by artists for drawing. Red chalk, or reddle, is an argillaceous red oxide of iron.

CHALKLEY, Thomas, a preacher of the society of Friends or Quakers, born in London, March 3, 1675, died in the island of Tortola, West Indies, Sept. 4, 1741. At the age of 20 he was pressed on board a man-of-war, but after a day's detention was discharged on account of his scruples about bearing arms. He engaged in trade for a while, and having made a little money became

an itinerant preacher. He went to America in 1698, landing in Maryland and travelling for a year in Virginia and New England, after which he returned home and married. He then decided to remove permanently to America, made his home in Philadelphia, and spent the rest of his life mainly in travelling and preaching in the English colonies. In 1707 he visited Europe, and after travelling through the British islands made an excursion to Holland and Germany. He went several times to the West Indies, and was engaged in the work of his itinerant ministry at Tortola when he died of fever after a few days' illness. He left an interesting journal of his "Life, Labors, Travels," &c., which was published with a collection of his writings at Philadelphia in 1747, and was reprinted in one volume in New York in 1808. By a bequest in his will he founded the library of the four monthly meetings of Friends at Philadelphia.

CHALLENGE. This word, which is now, except in a legal sense, used chiefly to imply a provocatory summons to mortal combat, seems originally to have conveyed within itself the idea of an appeal, of an exception taken, or a claim asserted, and a disinclination to submit to some decision or arbitrament, rendered or about to be rendered, and removal of the subject matter of dispute to some other court or tribunal. Thus, in ancient times, the duello was never the mode of settlement of an angry personal dispute; but it was the trial of a solemn cause before the actual court and in the presence of God. The challenger took exception to the truth of the allegation made against him by his adversary or opponent, and removed the adjudication of the cause, by appeal of challenge, from the human court of law, before which it was pending, to the divine court of equity, which was believed directly to interfere in the event of wagers by battle, and to give the strong arm and the sharp sword to the righteous party. In the same sense, when a jury is challenged, whether by the array or by the poll, exception is taken to the fairness of the impanelling of the whole jury, or to the partiality of the individual juror; and, having taken exception, the person accused by his challenge removes the adjudication of his cause from that entire jury, or from that individual as part of it, to some other, by whom he believes he can have a fair trial, which he denies that he can as it is at present constituted. Challenges to jurors are either to the array, which is to the whole panel, and founded upon some error or partiality on the part of the officer summoning them, or to the polls or individual jurors separately. The latter may be either peremptory or for cause. A certain number of peremptory challenges is allowed in criminal cases, for which no reason need be assigned; but for others legal cause must be given, the sufficiency of which will be determined by the court, or may be referred to triers, if depending upon

disputed matters of fact. The want of statutory qualification, defect of age or mental capacity, bias or partiality for or against a party, a definite opinion formed or expressed upon the case, and relationship by blood or affinity to a party, are causes of challenge; and in capital cases conscientious scruples against the death penalty.—A challenge as a preliminary to a duel is forbidden by the laws of most of the United States, and in the American army by the articles of war. Any officer or soldier sending a challenge to another officer or soldier, or accepting a challenge if sent, incurs the penalty, if a commissioned officer, of being cashiered; if a non-commissioned officer or soldier, of suffering corporal punishment. Any officer who knowingly or willingly suffers any person whatsoever to go forth to fight a duel, is punishable as a challenger, and seconds are not distinguished from principals. The punishment is at the discretion of the court martial, of which if any member is challenged by a prisoner, that member withdraws, and the court is closed to determine upon the relevancy or validity of the challenge. If the challenge is disallowed, the member resumes his seat.—Challenge is also a hunting term, used of hounds or beagles, when, at first finding the scent of their game, they presently open cry; the huntsmen then say they challenge.—Challenges are also used at the polls to prevent illegal voting. Any bystander can challenge a vote and demand that the person offering it be put upon oath. But this duty is usually assigned to persons selected by each party.

CHALLIS, James. See supplement.

CHALLONER, Richard, an English bishop and historian, born in the diocese of Chichester, Sept. 29, 1691, died in London, Jan. 12, 1781. Having become in his youth a Roman Catholic, he was sent by Dr. Gother to the English college at Douai in 1704, of which institution he was vice president from 1720 to 1730. He then returned to England, and served as a missionary priest till Jan. 29, 1741, when he was consecrated bishop of Debra and coadjutor to Bishop Petre, whom he succeeded as vicar apostolic of the London district in 1758. The penal laws made his ministry one of danger, for he was actually indicted under them; but he discharged his duties with unwavering zeal, and organized educational establishments for both sexes. His pen was never idle; his works covered a wide range, and they contributed more than those of any other writer to form the language of religious thought among English-speaking Catholics. His edition of the Bible (5 vols. 12mo, 1750) superseded the old Douai edition, and, though constantly modified, is the Bible still in use among Roman Catholics. It was strictly reprinted for the first time at New York in 1870, only typographical errors being corrected. His "Think Well On't," "Grounds of the Catholic Doctrine," "History of the Protestant Religion," "Catholic Christian Instructed" (in the preface to which he

answered Conyers Middleton's "Letter from Rome"), "Meditations," "Lives of the Fathers of the Desert," "Garden of the Soul, a Manual of Prayers," and his translations of "The Following of Christ" and "The Introduction to a Devout Life," have been reprinted frequently in England, Ireland, and America. His "Memoirs of the Missionary Priests and other Persons of both sexes who suffered Death in England on account of their Religion" has been several times reprinted. Among his other works were "Britannia Sancta" (2 vols., 4to), "Unerring Authority of the Catholic Church," "British Martyrology," and a "Caveat against the Methodists." There is a life of him by Barnard (London, 1784), and a short one by Bishop Milner.

CHALMERS, Alexander, a British author, born at Aberdeen, Scotland, March 29, 1759, died in London, Dec. 10, 1834. He was the son of a printer, received a classical education, and after his arrival in London, about 1777, he wrote for the press and edited many works and several periodical publications. His fame rests on the "General Biographical Dictionary" (32 vols., 1812-'17). He also prepared annotated editions of the British essayists, of Shakespeare, and of the English poets from Chaucer to Cowper. In 1820 he published an abridgment of Johnson's English dictionary by Todd; the 9th edition of Boswell's Johnson in 1822; and a new edition of Shakespeare and one of Johnson's works in 1823. Among his other editions were the complete writings of Fielding, Bolingbroke, and Gibbon, besides a vast number of individual biographies. At different periods he was editor of the London "Morning Herald," associate editor of the "Morning Chronicle," and a frequent contributor, under the signature of "Senex," to the "St. James's Chronicle," as well as to the critical reviews.

CHALMERS, George, a British historian, born at Fochabers, Scotland, in 1742, died in London in 1825. He studied law at Aberdeen, accompanied an uncle to the North American colonies, and settled at Baltimore. At the commencement of the revolution he returned to England. He wrote "An Estimate of the Comparative Strength of Great Britain" (1782; new and enlarged ed., 2 vols., 1810), and "Political Annals of the United Colonies" (1780; new and enlarged ed., 2 vols., Boston, 1845); the lives of Defoe, Thomas Paine, and others; and "Life of Sir David Lyndsay, and a Glossary of his Poetical Works" (3 vols., 1806). A second edition of his valuable "Life of Mary Queen of Scots, from State Papers," was published in 3 vols. in 1822. His principal work is "Caledonia," a comprehensive historical account of Scotland from the earliest periods (3 vols., 1807-'24). This was to have extended to six volumes, and the fourth volume was left in MS.

CHALMERS, Thomas, D.D., a Scottish clergyman and author, born at Anstruther, Fifeshire, March 17, 1780, died at Morningside, near

Edinburgh, May 31, 1847. His father was a shipowner and general merchant. Destined for the church, he was sent at the age of 12 to the university of St. Andrews, where his favorite studies were mathematics, ethics, and political economy. In his 19th year he received a preacher's license in the Scottish church, but declined to assume a pastorate, and spent the two subsequent winters in Edinburgh, where he was employed in teaching while pursuing a wide range of study under Dugald Stewart, Robinson, Playfair, and other professors. From assistant minister in a small parish he became in 1803 minister at Kilmany, Fifeshire, at the same time lecturing upon mathematics and chemistry at St. Andrews and gaining reputation as a savant. In 1804 and 1805 he applied unsuccessfully for professorships of natural philosophy at St. Andrews and of mathematics at Edinburgh. His first effort in authorship was a pamphlet to prove that the vigorous prosecution of science was not incompatible with ministerial duties and habits. On Napoleon's menace of invading England, Chalmers joined a corps of volunteers both as chaplain and lieutenant. In 1808, upon the alarm created by Napoleon's decrees against British commerce, he published his "Inquiry into the Extent and Stability of National Resources," to show that the apprehensions were groundless. He had already become a contributor to the "Edinburgh Encyclopædia," and the article on Christianity was assigned to him. While preparing this article, amid many domestic bereavements and a long and severe illness in 1809, which brought him near to the grave, he experienced a great spiritual change, and upon his recovery displayed a fervor in the pulpit and in his household visitations which was new to his parishioners. Cherishing scientific and literary studies with the same ardor as before, and contributing to the "Christian Instructor" and the "Eclectic Review," yet all his thoughts were tempered by a deep sense of religion. Having before belonged to the "moderate" party in the Scottish church, he now ranked with the "evangelical" party, which was in the minority, and his pulpit eloquence attracted listeners from great distances, and made him famous through the south of Scotland. In 1812 he married, and his wife, who survived him, bore him six children. In 1813 his article on Christianity appeared in the "Encyclopædia," and was immediately republished in a separate volume, with additions, under the title of "Evidences of Christianity." During the next two years he was busily engaged in organizing Bible and missionary societies, with a view to providing for the spiritual and general improvement of all his parishioners. He wrote about this time for the periodical press on missions and on Cuvier's theory of the earth. In 1815 he became minister of Tron parish, Glasgow, and during the eight years of his residence in that city he enjoyed unrivalled renown as a pulpit orator. The "Astronomical

Discourses," a series of weekly lectures on the connection between the discoveries of astronomy and the Christian revelations, were published in 1817, and within a year nearly 20,000 copies of them were sold. His fame had meantime extended from Scotland to London, where he preached first in this year. In a time of high political excitement all parties thronged to hear him. Canning and Wilberforce went together. The latter wrote in his diary: "Canning was at first disappointed by the preacher's peculiar manners, but at the end of the sermon he said to Wilberforce, 'The tartan beats us; we have no preaching like that in England.'" The article on "Pauperism" contributed to the "Edinburgh Review" immediately after his return to Scotland, and the tracts on the "Christian and Civic Economy of Large Towns," which soon followed, indicate what was then the direction of his efforts. It was his aim by a thorough organization to revive the old parochial system of Scotland, and, by dividing the community into small manageable masses, to bring every member of it directly under educational and ecclesiastical influences. To apply his scheme, he exchanged the Tron parish for the neighboring one of St. John's (1819), in which out of 2,000 families there were more than 800 unconnected with any Christian church, and a countless number of untaught children. The entire management of the poor in that parish was committed into his hands as an experiment, and by strict parochial oversight the entire pauper expenditure was reduced in four years from £1,400 to £280 per annum. Every street and lane was visited periodically by his agents and teachers. In this great labor Edward Irving, then in the beginning of his career, was his assistant. Dr. Chalmers had never ceased to aspire to a professorship in one of the Scottish universities, and in January, 1823, he accepted a call to the chair of moral philosophy in the university of St. Andrews. In this office he remained five years, and its literary results were his "Lectures on Moral Philosophy," and his work on "Political Economy in connection with the Moral Aspects of Society." He had given a new intellectual impulse to the studies in his department, when in 1828 he was transferred from St. Andrews to the chair of divinity in the university of Edinburgh, where he remained during the next 15 years. In 1830 he was appointed royal chaplain. He carried his eloquence and enthusiasm into the class room, which was filled not with students alone, but with clergymen of various denominations and eminent literary and scientific men. In 1833 he published his Bridgewater treatise on the "Adaptation of External Nature to the Moral and Intellectual Constitution of Man;" in 1838 he delivered a course of lectures in London in defence of church establishments; and after a short visit to France he travelled through Scotland, to lecture and collect funds in behalf of the move-

ment which he had initiated of so increasing the number of churches in the country, that no locality should be without the discipline of religion. In 1834 he was elected fellow of the royal society of Edinburgh, and in 1835 the degree of D. C. L. was conferred upon him by the university of Oxford. He had become the acknowledged leader of the evangelical party in the church of Scotland, and in 1832, when that party attained the majority, he had received the highest honor which that church can bestow, by being appointed moderator of the general assembly. It was mainly by his influence that this assembly passed in 1834 the famous veto act, which, being declared illegal, led to violent controversies and disturbances, which culminated in 1843 in a considerable secession from the established church, and in the foundation of the Free Church of Scotland, with Dr. Chalmers as the first moderator. (See FREE CHURCH OF SCOTLAND.) He immediately resigned his chair in the university, and devoted the remaining four years of his life with his characteristic skill and energy to the organization and consolidation of the new church. At the same time he was the principal and professor of divinity in the newly established college connected with the Free Church, and wrote for the "North British Review," which periodical was founded under his auspices. On his return from a journey to London which he had undertaken to enlist the sympathies of leading statesmen in behalf of his views on national education, he retired to rest in his usual health, but was found next morning dead in bed, without a single trace of suffering on his countenance.—The following are his collected writings in the order of their publication (25 vols. 12mo, Edinburgh): vols. i., ii., "Natural Theology;" iii., iv., "Christian Evidences;" v., "Moral Philosophy;" vi., "Commercial Discourses;" vii., "Astronomical Discourses;" viii., ix., x., "Congregational Sermons;" xi., "Sermons on Public Occasions;" xii., "Tracts and Essays;" xiii., "Introductory Essays to Select Authors;" xiv., xv., xvi., "Polity of Nations;" xvii., "Church Establishments;" xviii., "Church Extension;" xix., xx., "Political Economy;" xxi., "Parochial System;" xxii.–xv., "Lectures on the Romans." His posthumous works, edited by the Rev. Dr. Hanna (9 vols. 12mo, Edinburgh and New York, 1847–'9), are: "Daily Scripture Readings" (3 vols.); "Sabbath Scripture Readings" (2 vols.); "Sermons," illustrative of different stages in his ministry (1 vol.); "Institutes of Theology," a reproduction of his theological lectures (2 vols.); "Prellections on Butler's Analogy" (1 vol.). His "Christian Evidences" have passed through many editions, and have been twice translated into German (1834 and 1841), and into French (1819 and 1836). A German translation of his "Civil and Christian Economy of Large Towns," by O. von Gerlach, appeared in Berlin in 1847; and a French selection of his sermons by E.

Diodati (1825) was followed by *Révélation en harmonie avec l'astronomie moderne*, a version of his "Astronomical Discourses" (1826). His writings on political economy were also highly appreciated in France and Germany, and led the French institute to elect him in 1834 as corresponding member. The principles pervading his "Political Economy in connection with the Moral State and Prospects of Society" (Glasgow, 1832), being chiefly those of Malthus, have incurred the censure of McCulloch, who likewise disapproved of Chalmers's opposition to poor laws and other compulsory provisions for the destitute. His literary and scientific activity, prodigious as it was, is yet regarded as on the whole subordinate in importance to his social and ecclesiastical reforms and to the influence of his personal magnetism and genius. Yet his appearance and manner were far from prepossessing; his face when in repose was singularly unanimated; his gestures were rather awkward; his voice was neither strong nor musical; his style was often inflated, and disfigured by a somewhat eccentric phraseology. But his earnest piety and fervid imagination, which imparted a poetic charm to his discourses and writings, more than redeemed all his oddities. His broad Scotch accent, his unaffected manner, and his strong sympathies with the habits and feelings of the Scotch masses made him as popular with the people as his genius made him famous among scholars.—See "Memoirs of the Life and Writings of Dr. Chalmers," by his son-in-law, the Rev. William Hanna, LL. D. (4 vols. 8vo, Edinburgh and New York, 1849–'52); "Correspondence," edited by the same (1853); "Memorials of his Time," by Henry Cockburn (London, 1856), especially interesting as an authority on Dr. Chalmers's peculiarities of manner; "Memoir of the Christian Labors, Pastoral and Philanthropic, of Thomas Chalmers," by Francis Wayland (Boston, 1864); "Thomas Chalmers, D. D., a Biographical Sketch," by Dean Ramsay (1867); and "Thomas Chalmers, a Biographical Study," by J. Dodds (New York, 1870). In 1869 preliminary steps were taken for the erection at Edinburgh of a monument to Chalmers.

CHÂLON-SUR-SAÔNE (anc. *Cabillonum* or *Caballinum*), a walled city of France, in the department of Saône-et-Loire, 33 m. N. of Mâcon, and 185 m. S. E. of Paris; pop. in 1866, 19,982. It is situated on the Saône, in one of the most fertile regions of Burgundy. It has four suburbs, fine promenades, a splendid quay, and a stone bridge of five arches over the Saône. The principal church is that of St. Vincent, formerly a cathedral. The canal du Centre here unites the Saône with the Loire; and this, with the railway from Paris to Lyons, gives to the town an important transit business. There is also an active trade in wine, vinegar, mustard, grain, and various local manufactures.—It was an important city of ancient Gaul and of the Roman empire, and figures in Cæsar's Commentaries. Converted to Christianity by St. Marcel

and St. Valerius in the 2d century, Châlon early became the seat of a bishop, who afterward assumed the title of count of Châlon and baron of Salle. The see was united with that of Autun in 1801. Many important ecclesiastical councils were held here from the 5th to the 12th century. Attila destroyed the town. Having passed from the Burgundians to the Franks, it became in the 6th century the capital of the first Frankish kings of Burgundy. In the 10th century it formed with its territory the Burgundian county of Chalonnois, which reverted to the duchy of Burgundy in 1237, and under Louis XI. was united with the latter to the French crown. Abélard died in the abbey of St. Marcel near this town, the only vestige remaining of which is the church.

CHÂLONS-SUR-MARNE (anc. *Catalauni*), a walled town of Champagne, France, capital of the department of Marne, 90 m. E. of Paris; pop. in 1866, 17,692. It is situated on the right bank of the Marne, on the canal uniting that river with the Rhine. The streets are narrow, but well built, and the promenade du Jard is planted with 2,000 elm trees. The cathedral has been often restored, before and after the fire of 1668. The finest church, that of Notre Dame, suffered greatly during the revolution. The former palace of the count of Artois, containing valuable archives, is used as the prefecture. There are a fine town hall, a public library of 30,000 volumes, a departmental college, a school for art and industry, a cabinet of natural history, a botanical garden, and agricultural, scientific, and artistic societies. Leather, woollen, and cotton goods, hosiery, and other articles are manufactured, and there is an active trade in grain, flour, hemp, wool, and other commodities; but the chief trade consists in champagne wine, of which the average annual export is about 1,000,000 bottles. The Jacqueson cellars, in the suburb of that name, can hold over 3,000,000 bottles; the galleries, excavated in the chalk rock, being 6 m. long. The beautiful Gothic miniature cathedral of Notre Dame de l'Épine, on the Vesle, 6 m. from Châlons, has been restored since 1860.—The city belonged to the territory of the Catalauni, in Gallia Belgica. Tetricus was defeated here by Aurelian in A. D. 274; the Alemanni by Jovinus in 366; and the great battle between the combined armies of Aëtius and Theodoric and the Huns under Attila was fought in 451 near this city, on the Campi Catalaunici, which lie on the branch railway from Châlons to Rheims. (See *Ætius*.) Attila, who was defeated, is said to have been induced by the eloquent pleading of the bishop St. Alpinus to spare the city. The bishops of Châlons formerly wielded great power. The city was captured by Count Herbert of Vermandois in the 7th, and by Rudolph of Burgundy and Robert of Vermandois in the 10th century. An ecclesiastical council was held here in 1129, when the bishop of Verdun was deposed by St. Ber-

nard, who afterward preached a crusade here. Henry IV. removed the parliament from Paris to Châlons in 1589, and in 1591-'2 citizens burnt the bulls by which Gregory XIV. and



The Church of Notre Dame.

Clement VIII. excommunicated that king. Châlons was occupied by the Prussians in 1814, and taken by the Russians in July, 1815. In 1856 Napoleon III. established the military camp of Châlons, about 11 m. N. E. of the town, on the railway to Rheims and Verdun. Periodical exercises were held here from 1857 to 1870; and on the outbreak of the Franco-German war, Canrobert was stationed here as commander of the 6th army corps. The imperial headquarters, comprising 25 buildings, were about half a mile from the camp. After the first defeats of the French and the transfer of Canrobert's troops to Metz, the débris of the armies of MacMahon and De Failly were reorganized here by the former, and reinforced. They evacuated the camp and partly destroyed it in the night of Aug. 21-22; and on the following day the city of Châlons was occupied by the Germans, who used the place as a rallying point between their army before Paris and their forces in the interior of France.

CHALOTAIS, La, Louis René de Caradene de, a French statesman and author, born at Rennes, March 6, 1701, died there, July 12, 1785. He was procureur général of the parliament of Brittany, and became known by his reports to that body against the Jesuits, the authorship of which was ascribed to D'Alembert. A new edition of these *Comptes rendus des constitutions des Jésuites* (2 vols., Paris, 1761-'2) was published in 1826. According to Grimm, his reports led to the abolition of the society of Jesus in France; and he as well as Voltaire also awarded the highest praise to La Chalotais's *Essai d'éducation nationale* (1763; new

eds., Paris, 1825 and 1826). Having become engaged in a dispute with the duke d'Aiguillon, governor of Brittany, that functionary accused him of seditious proceedings, and had him arrested (Nov. 11, 1765), with four of his colleagues and his son Caradeuc de la Chalotais, who was also a procureur général in the Rennes parliament. He was detained in the castle of St. Malo, and wrote there, Jan. 15, 1766, with his toothpick in the absence of pens, his first memoir in vindication of his course. Voltaire averred that this toothpick had achieved immortality. He wrote several similar memoirs, and the proceedings against him, being regarded as an infringement of the rights of parliament, gave rise to protracted controversies. The parliament eventually instituted proceedings against the duke d'Aiguillon, who was proved to have procured evidence against La Chalotais by false witnesses, and whose papers were seized and publicly burned by order of the parliament, though he brought countercharges against his adversaries, and the crown seemed to take up his case as against parliament. After much agitation the matter came before the parliament of Paris in 1770. Louis XV. at first presided, but soon withdrew on the pretext that his royal authority was impaired by the pretensions of the parliament. This body, however, insisted on its prerogatives, and continued its investigations; but La Chalotais did not recover his liberty till 1775, after the king's death, when he resumed his previous position at the parliament of Rennes. *Le procès de M. de la Chalotais* was published in 1767 (3 vols. 4to).

CHALYBÄUS, Heinrich Moritz, a German philosopher, born at Pfaffroda, Saxony, July 3, 1796, died in Dresden, Sept. 22, 1862. He studied philology and philosophy, received the degree of D. D. from the Leipsic university in 1820, became teacher and professor in various places, and was from 1839 to 1862 professor of philosophy at the university of Kiel, with the exception of a brief period subsequent to the Schleswig-Holstein war. This appointment was mainly due to the reputation of his *Historische Entwicklung der speculativen Philosophie von Kant bis Hegel* (Dresden, 1836; 5th ed., 1860; English translation by Tulk, London, 1854). He wrote several other works, the most important of which was *System der speculativen Ethik* (2 vols., Leipsic, 1850), in which he defines ethics as the complete embodiment of absolute truth. His *Philosophie und Christenthum* (Kiel, 1853) and *Fundamental-Philosophie* (1861) were his latest publications.

CHALYBEATE (from *Chalybes*, a Scythian people, S. and S. E. of the Black sea, who worked in iron, whence Gr. *χάλυψ*, steel), a name now applied to waters and medicines which contain iron. It generally exists in them in the state of the carbonate of the protoxide, which is soluble so long as an excess of carbonic acid gas is present; as this is given off, the protoxide absorbs oxygen, and is converted

into an insoluble hydrated sesquioxide, which falls down as a yellow ochreous powder. Chalybeate waters possess a styptic taste, and give the characteristic reactions indicative of the presence of iron by the addition of nutgalls and of ferrocyanuret of potassium. In this country springs that might claim this name are very common. The most important of them are those of Bedford and Brandywine in Pennsylvania. Arsenic and copper are found in Europe in the sediment of chalybeate springs. They appear to do no harm, on account of the antidotal properties of the oxide of iron.

CHAM, the assumed name of AMÉDÉE DE NOÉ, a French caricaturist, born in Paris, Jan. 26, 1819. He is a son of the count de Noé, studied painting, and acquired celebrity by his caricatures in the *Charivari* and other illustrated papers, many of which have been collected in separate publications. He is also the joint or sole author of librettos and vaudevilles. His cartoons, many of which have a political aspect, are notable for their sharp point and free, spirited execution.

CHAMA (Gr. *χάω*, to gape), a genus of lamelli-branchiate bivalves of the family *chamidae*, which includes also the genera *monopleura* and *diceras*, all distinguished by inequivalve shells, one of which has two teeth and the other one; the foot is small, as also the corresponding pedal orifice. More than 50 species are described, inhabiting tropical seas, especially among coral reefs, as deep as 50 fathoms; nearly as many fossil species have been found, from the greensand forward, both in America and Europe. Having two abductor muscles, they belong to the dimyary group, and, like the kindred families of this group, have short siphons and are marked by a simple pallial line. By Linnæus, Cuvier, and De Blainville, the genus was made of great importance, including many shells now transferred to other families. The giant clam, *tridacna gigas*, was one of these. (See CLAM.)

CHAMBERLAIN (Fr. *chambellan*; Lat. *camerarius*), an officer attached to royal courts, and to establishments of the great. The word means simply a person having care of apartments, and in its early acceptance was so employed. At present the duties of the office are nominal, or limited to such easy service as attending on the person of princes. Formerly the office had so many perquisites that it was sought by individuals of noble families, and finally became one of the grand offices of the crown. The title of grand or great was added to distinguish the chamberlains of sovereigns from those of lesser dignitaries. The earliest officer of this rank in France was appointed by Louis VII.; 39 chamberlains followed in succession till the time of Louis XIV., when the dignity was suffered to lapse. Napoleon I. revived the office. In Anglo-Saxon times the chamberlain was called the *camerarius*, and had charge of the king's treasure. Under the Norman kings the office of lord great chamber-

lain was hereditary, and by the statute of precedence, 31 Henry VIII., his place was next that of the lord privy seal, where it also is under the most recent statute on that subject. The duties which devolve upon the office now are the dressing and attending on the sovereign at coronation; the care of the ancient palace at Westminster; the furnishing of the houses of parliament and Westminster hall for great occasions; and during the sitting of parliament he has charge of the house of lords. In consequence of descent to females, the office is now held jointly by the families of Cholmondeley and Willoughby d'Eresby, whose representatives discharge the duties alternately in each succeeding reign.—The office of lord chamberlain in Great Britain is distinct from this, is filled by appointment, and changes with the administration. He is the head of the royal household, and has control over all the officers and servants except those of the bedchamber, and the royal chaplains, physicians, surgeons, &c.; the royal tradesmen are also appointed by him. Theatres in towns in which a royal palace is situated are licensed by him, and he is also the licenser of plays, and has the regulation of the companies of actors at the royal theatres. He also issues the royal invitations to balls, parties, &c.; and applications for presentations at court must be made to him. A vice chamberlain performs his duties in his absence. There was also a chamberlain and vice chamberlain in the exchequer court of the county palatine of Chester; and many of the municipal corporations of England have an officer by this title, whose duties in general are to take charge of the property and finances of the corporation. The chamberlain of the city of New York is charged with similar functions. The chamberlain of London has also duties of a judicial nature, pertaining to masters and apprentices.

CHAMBERLAYNE. I. Edward, an English author, born at Odington, Gloucestershire, in 1616, died at Chelsea in 1703. Educated at Oxford, he travelled abroad during the civil wars. In 1679 he was appointed tutor to Henry, duke of Grafton, a natural son of Charles II., and afterward to Prince George of Denmark, the husband of Queen Anne. He is best known by his "*Angliæ Notitia*, or the Present State of England" (London, 1667), to which Macaulay frequently refers, and which passed through many editions. An inscription on his grave in Chelsea states that six of his works were buried along with him. **II. John**, son of the preceding, died in 1723. He continued his father's work under the title of *Magnæ Britanniciæ Notitia*, &c., publishing several new editions. With all its defects, this was the only statistical authority of his day. He was a graduate of Oxford, wrote several original works, and translated the "Religious Philosopher" from the Dutch of Nieuwentyt (3 vols., 1718).

CHAMBERS. I. An E. county of Alabama, bordering on Georgia; former area, 775 sq. m.,

which has been diminished by taking a portion to form Lee county; pop. in 1870, 17,562, of whom 8,588 were colored. It is partly bounded on the E. by the Chattahoochee river, and intersected by the Tallapoosa. The surface is hilly, and most of the land productive. The Montgomery and West Point railroad passes through the S. E. part. The chief productions in 1870 were 39,532 bushels of wheat, 205,099 of Indian corn, 35,921 of oats, 24,734 of sweet potatoes, and 7,868 bales of cotton. There were 1,382 horses, 1,457 mules and asses, 2,895 milch cows, 4,814 other cattle, 3,861 sheep, and 9,725 swine. Capital, Lafayette. **II.** A S. E. county of Texas, bounded S. by the gulf of Mexico, having Cedar bayou for a part of its W. boundary, and indented on the W. and S. W. by East and Galveston bays; area, 900 sq. m.; pop. in 1870, 1,503, of whom 452 were colored. It is intersected by Trinity river, the banks of which are timbered, but the greater portion of the county consists of prairie lands. The chief productions in 1870 were 23,759 bushels of Indian corn, 15,200 of sweet potatoes, and 105 bales of cotton. There were 1,444 horses, 1,205 milch cows, 24,572 other cattle, 1,700 sheep, and 2,352 swine. Capital, Wallisville.

CHAMBERS, Ephraim, an English cyclopædist, born at Kendal, Westmoreland, in the latter half of the 17th century, died in London, May 15, 1740. He was the son of a Presbyterian freeholder, and while apprentice to the mechanic Senex, who encouraged his scholarly tastes, he began to prepare a cyclopædia, which after many years of arduous labors, in his chambers at Gray's Inn, was published by subscription (2 vols., 1728; 2d enlarged ed., 1738; 5th ed., 1746). Subsequently this work was enlarged by Mr. Scott and Dr. Hill, and eventually served as a basis for Rees's Cyclopædia (4 vols., 1781-'6; new and enlarged, ed., 45 vols., 1803-'19). Chambers contributed to the "Literary Magazine," and prepared with John Martyn an abridged translation of the philosophical history and memoirs of the French academy of sciences (5 vols., 1742). He was elected fellow of the royal society, and was buried in Westminster abbey.

CHAMBERS, George, an English artist, born at Whitby, Yorkshire, late in the 18th century, died in London, Oct. 28, 1840. The son of a poor seaman, he became cabin boy on a sailing vessel; but his sketches of shipping induced his master to cancel his indentures. After various struggles, during which he perfected his knowledge of art, he was employed by Thomas Horner for seven years in preparing the panorama of London for the Colosseum. Admiral Lord Mark Kerr became his patron, and he painted the "Opening of New London Bridge" for William IV., and a view of "Greenwich Hospital" for Queen Adelaide. His appointment as marine painter to their majesties had opened to him a way to fame and fortune, when his health broke down. His best works

are his pictures of naval battles, three of which are in Greenwich hospital.

CHAMBERS, Sir William, an English architect, of Scottish descent, born in Stockholm about 1726, died in London, March 8, 1796. He was educated at Ripon, Yorkshire, went as supercargo to the East Indies, spent some time in China, and brought back many drawings of Chinese buildings and costume, which were published in 1757. He then devoted himself to architecture, and on returning from France and Italy he settled in London in 1744, and was appointed drawing master to the prince of Wales, afterward George III. He laid out the royal gardens at Kew in the Chinese style, and built the villa of the earl of Besborough at Roehampton, and other fine mansions, in the Italian style. His masterpiece was Somerset house in London, which he rebuilt in 1775. He published in 1759 a "Treatise on Civil Architecture," which has been several times reprinted; and in 1772 a "Dissertation on Oriental Gardening."

CHAMBERS, William and Robert, Scottish authors and publishers, born at Peebles, William in 1800, and Robert in 1802; the latter died March 17, 1871. Thrown in boyhood, after receiving the education which the schools of Peebles afforded, upon his own resources, William was apprenticed to a printer in Edinburgh, whither the family had moved, and afterward opened a book stall; while Robert, failing to obtain the collegiate education which he desired with a view to the university, at the age of 16 also opened a book stall. Until 1832 the brothers conducted separate establishments. William eked out the profits of his small trade by working at case and press, and in 1830 published his "Book of Scotland," an elaborate and comprehensive account of the usages and institutions, the schools, social system, and civil and religious organization of that country. Meantime Robert, sharing in the enthusiasm which was then introducing the national element so largely into Scottish literature, had published in 1823 "Illustrations of the Author of Waverley," a pleasant anecdotal volume, which at once attracted for the young author the notice of the leading literary men of Edinburgh. In 1824 appeared his "Traditions of Edinburgh," an authentic, detailed, and amusing account of the old memories and associations in which the various localities of that capital are so rich. It was dedicated to Sir Walter Scott, who had communicated to him valuable materials for it. This was rapidly followed by his "Popular Rhymes of Scotland" (1826), "Picture of Scotland" (1827), "History of the Rebellion of 1745-'6," "Life of James I.," and three volumes of "Scottish Songs and Ballads" (1829). In 1829 the brothers united their efforts in preparing the "Gazetteer of Scotland," which was completed and published in 1832, having been written for the most part by them in the intervals of business. In February, 1832, appeared the first

number of the "Edinburgh Journal," designed "to supply intellectual food of the best kind, and in such a form and at such a price as must suit the convenience of every man in the British dominions." It immediately attained a circulation of 50,000, whereupon the brothers united their places of business into one establishment. This journal has remained till the present time one of the most widely circulated of British periodicals. In 1834 they began the publication of a series of scientific and historical treatises, written in a popular style, under the title of "Information for the People," the average sale of the numbers of which was above 100,000 copies. They were followed by the "Biographical Dictionary of Eminent Scotchmen" (1835); "Cyclopædia of English Literature" (1844), at once historical and biographical, with well chosen extracts from the works of the principal British authors of every age; the "People's Edition of Standard English Works," "Papers for the People," "Miscellany," "Repository of Instructive and Entertaining Tracts," and other collections, all of which were in a cheap form and widely read. "Chambers's Educational Course," which has been completed by degrees, includes works in almost every branch of knowledge, and covers the entire ground from first lessons to accomplished scholarship. Robert Chambers devoted much time and attention to literary and scientific pursuits, while William was the business man of the firm. Among Robert's later productions are "Ancient Sea Margins" (1848); the "Life and Works of Burns" (4 vols., 1851-'2), the profits of which he generously gave to the poet's surviving sister; "Essays from the Journal" (4 vols.); "The Domestic Annals of Scotland" (1858); "The Book of Days" (1864); "Essays" (1866); and with his brother "Chambers's Encyclopædia" (10 vols. 8vo, 1860-'68; new ed., 1871-'2). He was also, without doubt, the author of the "Vestiges of the Natural History of Creation," a work remarkable for the force with which it advocates the so-called development theory. Satisfactory evidence of Robert Chambers having written this work is contained in letters to his life-long friend and correspondent William Wilson of Poughkeepsie, N. Y. He received the degree of LL. D. from the university of St. Andrews, whither he retired from active business, and spent the last three years of his life. William Chambers has contributed numerous essays to the "Journal;" has given his impressions of the United States in works entitled "Things as they are in America," and "Slavery and Color in America" (1854); and is the author of "Peebles and its Neighborhood," "About Railways," "Wintering at Mentone," "Youth's Companion and Counsellor," and "Improved Dwelling Houses for the Humble and other Classes in Cities," suggested by his experience in improving the dwellings of his tenantry on his estate of Glenomiester near Peebles, the cultivation and improvement of which forms a

pleasant relaxation for his well earned leisure. He has presented to his native town, at a cost of £30,000, a substantial building and an excellent library known as the "Chambers Institution," and has served two terms as lord provost of Edinburgh. In 1872 he published "Memoirs of Robert Chambers, with Autobiographical Reminiscences."—The publishing house of W. and R. Chambers is the largest in Scotland, employing more than 300 persons. The style of the firm remains unchanged, Robert Chambers's place being occupied by his eldest son Robert. They have also a publishing establishment in London, which was conducted until his death by David, a younger brother of William and Robert, who was admitted into the firm.

CHAMBERSBURG, a borough and the capital of Franklin co., Pennsylvania, situated on Conococheague creek, and on the Cumberland Valley railroad, 45 m. S. W. of Harrisburg and 135 m. W. of Philadelphia; pop. in 1870, 6,308. Turnpike roads connect it with Baltimore, Pittsburgh, and Philadelphia. The surrounding country, which forms part of the great limestone valley at the S. E. base of the Blue mountains, is populous and highly cultivated. There are manufactories of cotton, wool, flour, paper, and iron. The houses are mostly of brick or stone. The borough has a fine court house, a national bank with a capital of \$260,000, and 10 churches. It is the seat of Wilson college, an institution for the education of young ladies, under the control of the Presbyterians, which in 1871 had 9 instructors and 81 students. Three weekly newspapers and two monthly periodicals are published here. Chambersburg was set on fire by the confederates under the command of Gen. Early, during a raid into Pennsylvania, July 30, 1864, and two thirds of the town was destroyed.

CHAMBERTIN, a famous vineyard of France, in the department of Côte d'Or, 6 m. S. S. W.

of Dijon. It is about 60 acres in extent, divided among several proprietors. The annual produce rarely exceeds 150 pipes of red wine, which ranks among the best of Burgundy.

CHAMBERY (Ital. *Ciambéri*), a town of France, capital of the department of Savoie, situated within a circle of high mountains, on the rivulets Leisse and Albane, affluents of Lake Bourget, 44 m. S. S. W. of Geneva; pop. in 1866, 18,297. It is a picturesque town, with fine pleasure grounds and a bustling appearance, and is steadily increasing in prosperity owing to its situation on the railways from France to Switzerland and Italy. It is the seat of an archbishop. The remains of the ancient castle of the counts and dukes of Savoy are situated on a lofty eminence, with charming gardens and sloping terraces; only three of the towers, the chapel, and part of the building have escaped the fires of 1745 and 1798. The chapel is built after the model of the Sainte Chapelle in Paris, with fine lancet windows of painted glass. The prefecture is in the castle yard, which also contains the apartments formerly reserved for the use of the royal family of Sardinia. The most conspicuous monument, consisting of a fountain with figures of elephants, was erected in honor of Gen. de Boigne, who amassed a large fortune in India, and who appropriated more than 3,000,000 francs to hospitals and other benefactions in this his native place. The church of Lémene, on a rock near the Leisse, is the oldest in the district, and contains in the crypt the tomb of an Irish bishop. Among the other principal churches are the Gothic cathedral and the church of Notre Dame, in the Doric style. There were formerly 20 monasteries, of which only three convents and four nunneries are left. The finest modern public buildings are the theatre, the palace of justice, the town hall, the barracks, and a covered market. The principal educational institutions are an academy, a lyceum,



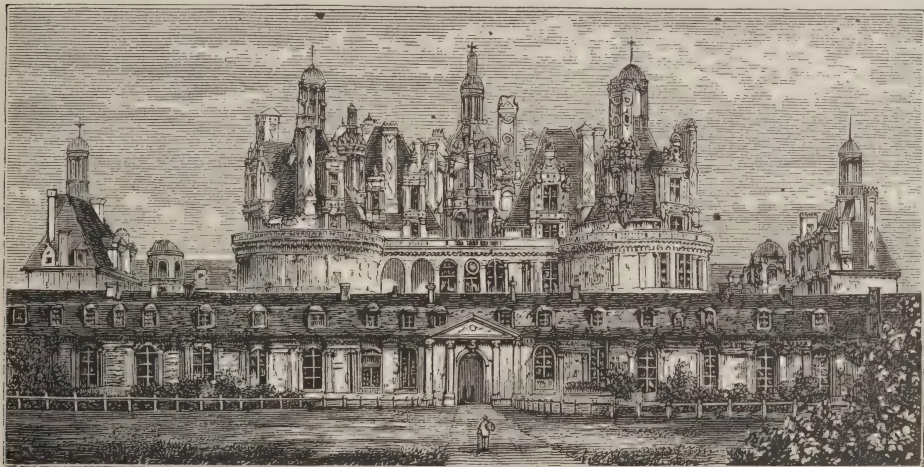
Chambéry.

a theological and normal seminary, and a school for the deaf and dumb. There are a museum of art and science, a public library with about 20,000 volumes and many important manuscripts, and a number of learned associations and charitable institutions. The Chambéry silk gauzes have long been renowned, and laces, silk, and woollen hosiery, hats, watches, and many other articles are manufactured here. An active trade is carried on in cereals, cattle, wine, leather, copper, raw silk, and other commodities.—Chambéry was ruled by counts in the 11th and 12th centuries, and in the 13th it became the capital of Savoy. It was occupied by the French in 1535, from which time it was alternately in their possession and in that of the native rulers till 1713, when Louis XIV. finally restored it to the dukes of Savoy by the treaty of Utrecht. After the French revolution it was once more under French domination as the capital of the department of Mont Blanc till 1815, when it was restored to Sardinia. In 1860 it came finally into possession of France with the rest of Savoy.

CHAMBLY, a S. W. county of the province of Quebec, Canada, bordering on the right bank of the river St. Lawrence, opposite the

island of Montreal; area, 189½ sq. m.; pop. in 1871, 10,498, of whom 9,755 were French. It is watered by the Richelieu and Montreal rivers, one being a continuation of the other, and contains an expansion of the Richelieu called the basin of Chambly, 2 m. in diameter, of nearly circular form, and interspersed with islands. On the W. side of the basin stands Fort Chambly, built by the French in 1711. In the southern part of the county there is a mountainous elevation. Chambly, sometimes erroneously supposed to imply wheat field, is the name of the original grantee of the seignior. The Champlain and Montreal and the Grand Trunk railways and the Chambly canal traverse the county. Chief town, Chambly, on the Richelieu, 12 m. E. S. E. of Montreal.

CHAMBORD, a village of France, in the department of Loir-et-Cher, 9 m. E. of Blois; pop. in 1866, 332. It is noted for its château, surrounded by a beautiful park, 21 m. in circumference. The counts of Blois had here a hunting lodge and pleasure house, built in 1090. It was added to the possessions of the crown by Louis XII., and torn down by Francis I. to make way for the present magnificent structure, which was commenced after designs



Castle of Chambord.

by Primaticcio, and continued in subsequent reigns; but the original plans were never carried out. Diana of Poitiers resided here, and the letters H. and D. entwined with a crescent still fill the compartments of the vaulted ceilings. Charles IX., Louis XIII., and Louis XIV. occasionally held their court here; and Molière gave here the first representation of his *Bourgeois gentilhomme*. Chambord afterwards became the residence for some years of Stanislas Leszczynski, ex-king of Poland. In 1745 Louis XV. bestowed it upon Marshal Saxe, who restored much of its former brilliancy. After his death, and that of his nephew the count de Frise, the château reverted to the crown; it was bestowed upon the Polignac

family by Louis XVI. in 1777, plundered by the mob in 1792, and sold as national property. In 1809 Napoleon gave it to Berthier, whose widow sold it in 1821 for nearly 1,800,000 francs to the legitimists, who presented it to the infant duke of Bordeaux, hence called count de Chambord.

CHAMBORD. I. Henri Charles Ferdinand Marie Diéudonné, count de, duke of Bordeaux, the representative of the elder branch of the French Bourbon dynasty, called by his partisans Henry V. of France, born in Paris, Sept. 29, 1820, seven months after the assassination of his father, Prince Charles Ferdinand d'Artois, duke de Berry. (See BERRY, DUCHESS OF.) The title of duke of Bordeaux was given him in com-

pliment to the legitimist zeal of that city, and that of count de Chambord after the estate of that name, presented to him by his partisans. He had among his tutors the baron Damas and Gen. d'Hautpoul; and after the revolution of July, 1830, during which his grandfather Charles X. and his uncle the duke d'Angoulême in vain resigned their rights in his favor, he lived in exile successively in Scotland, Austria, and for a short time in Italy, till 1845, when he established himself in London, where the large fortune which had been bequeathed to him by the duke de Blacas enabled him to live in fine style. In 1851, after the death of the duchess d'Angoulême, he inherited the domain of Frohsdorf, near Vienna, where he has since generally resided, having sold his palace in Venice in 1866. In August, 1850, he attended a gathering of legitimists at Wiesbaden, and in February, 1872, at Antwerp. He clings to the traditional Bourbon theory of the divine right of kings and of devotion to the see of Rome, from time to time issues manifestoes in this sense to the French nation, and firmly rejects all overtures aiming at a reconciliation with the house of Orleans at the expense of his principles; but has always refrained from violent assertions of his claims to the throne. In August, 1870, he gave 10,000 francs and the use of his château for the relief of wounded French soldiers and sailors, and in the summer of 1871 for the first time returned to France, but voluntarily left the country after a short stay at Chambord. **II. Marie Thérèse Béatrice Gaétane**, countess de, archduchess of Austria, wife of the preceding, born July 14, 1817. She is the eldest daughter of Francis IV., duke of Modena, and of the princess Maria Beatrice of Sardinia, great-granddaughter of Maria Theresa, and grand-niece of Marie Antoinette. Her sister married Don Juan de Borbon, and became the mother of Don Carlos, duke of Madrid. On Nov. 16, 1846, she married at Bruck, Styria, the count de Chambord. She is a highly accomplished princess, and takes much interest in the improvement of the working classes; and during the German war she attended to the sick and wounded French soldiers in Belgium and Switzerland.

CHAMBRAY, Georges, marquis de, a French soldier and author, born in Paris in 1783, died about 1850. He belonged to an ancient Norman family, and received the highest military education. He served in the Napoleonic wars, and was captured by the Russians, who banished him to the Ukraine, where he remained till the fall of Napoleon. From 1823 to 1829 he filled various military positions. His writings include *Philosophie de la guerre* (1827; 2d ed., 1829; continuation, 1835), and *Histoire de l'expédition de Russie* (2 vols., 1833; new ed., 3 vols., 1835), which acquired a European reputation.

CHAMBRE ARDENTE, a name originally applied in France to courts hung with black, and lighted by torches, where criminals of the high-

est rank were tried. Subsequently any extraordinary court of law was called *chambre ardente*; as for instance the tribunal which in 1535 was established by Francis I. for the special purpose of trying heretics. Under Louis XIV. the *chambres* were opened in 1679 for the purpose of trying Mme. de Brinvilliers, and other prisoners, and were then also called *cour des poisons*; but in 1680, after the execution of Mme. Voisin, the *chambres ardentes* were again closed. The extraordinary courts under the regency (1716), where the trial of the farmers of the public revenue took place, and those instituted for the registration of the shares of John Law, the financier, were also known as *chambres ardentes*.

CHAMBURE, Auguste Lepelletier de, a French soldier, born at Vitteaux, Burgundy, March 31, 1789, died of the cholera in Paris, July 12, 1832. By his audacity in the Napoleonic wars in Spain and Germany, and especially at Dantzic in 1813, he became known as *le diable*, and his *corps franc* of 100 men as the infernal regiment. After the capitulation of Dantzic he surrendered to the prince of Würtemberg, who sent him as a prisoner to Presburg. He was released in 1815 and restored to a military command in France; but in 1816 he was accused of a highway robbery upon two English officers, fled to Belgium, and in his absence was sentenced to hard labor for life. Pardoned in 1820, he prevailed upon Ary Scheffer and other eminent artists to prepare designs for his *Napoléon et ses contemporains*, which work achieved success owing to its magnificent illustrations. After the accession of Louis Philippe he became attached to the staff of Marshal Soult, minister of war.

CHAMELEON (*chamæleo*, Brongn.), a genus of saurian reptiles, inhabiting the warmest parts of Africa and India. The genus is characterized by teeth on the upper edge of the jaws, toes united into two groups, prehensile tail, and body compressed and covered with squarish scales, with or without a series of spiny processes along the back, belly, chest, and tail. The skin is chagreened with small scaly grains, the back is sharp, the tail round and slender. There are five toes on each foot, divided into two parcels, one of two and the other of three, each united by the skin as far as the claws. The tongue is fleshy, cylindrical, and capable of an elongation of six or seven inches; the teeth are trilobed; the eyes are large, almost covered by the skin, except a small hole opposite the pupil, and are capable of movements independent of each other. The back of the head is raised in a pyramidal form; there is no visible external ear; the first rib is united to the breast bone, the rest being continued to their fellows of the opposite side, enclosing the abdomen in an entire circle. The lungs are large, and admit of great inflation. The most common species is the *chamæleo vulgaris* (Lacép.), so well known to travellers in Egypt and northern Africa. Many other species are described

from the Seychelles islands, Isle of Réunion, Mauritius, and the Cape of Good Hope. The chameleon is well described by Aristotle in his "History of Animals." The name is derived from the Greek, and signifies little lion, or, as some maintain, camel lion. There is probably no animal about which more prejudices and errors have existed from the remotest antiquity than the chameleon. The two most remarkable faculties attributed to it are those of being able to live on air, and of changing color according to the objects to which it comes near; the first it certainly does not possess, and the latter but partially. Like all other reptiles, it can remain for months without eating, which, with its sudden changes of bulk, gave rise to the opinion that it lived on air. Chameleons eat flies and other insects, which they seize by means of their long sticky tongues, the only part of their bodies which they move with any vivacity. It is true that the chameleon changes its colors with great rapidity, but the changes are not determined by the colors of surrounding objects, nor by the greater or less amount of blood sent



Chameleon (*Chamaeleo vulgaris*).

to the skin. Other reptiles possess this power of changing color, as also do many fishes, as the *coryphæna* (vulgarly called dolphin), and many of the mollusks, as the argonaut and the squid. It has been ascertained by experiments that the varieties of color in the squid are due especially to changes in the surface of the skin from the voluntary contractions of the muscular fibres in the dermis, modifying the reflections from the pigment spots as well as from the colorless portions of the skin. It is probable, considering the scaly character of its skin, that similar surface reflections, from contraction of the muscular fibres of the dermis, are the causes of the changes of color in the chameleon; and that the inflation of the lungs and body, and the changes in the cutaneous circulation, are merely secondary agents. The natural color of the animal is a fine green, tinged in some parts with reddish brown and grayish white; from this the hues vary to deep bluish green, yellow, blackish, and various shades of gray; the colors are the brightest in the warmest and sunniest weather. They are often seen

of the same colors as surrounding objects, which they doubtless assume instinctively as a means of protection against their numerous enemies. The chameleon can also inflate its body even to its feet and tail, by slow and irregular motions; this in a moderate degree may aid the muscular contractions of the skin in the production of its brilliant surface changes. The chameleon moves very slowly; it will remain for days on the branch of a tree, to which it fixes itself very firmly by means of its peculiarly divided feet and prehensile tail. This slowness of motion, and the absence of all defensive and offensive weapons, render it an easy prey to its enemies. Whether upon a tree or on the ground, it is an awkward animal. The native Africans and Asiatics consider chameleons harmless creatures, and even pet them in their dwellings on account of their destruction of insect pests. When kindly treated they are very gentle, but they readily fight with each other, slowly opening and shutting their jaws, like the blades of scissors. The female lays about a dozen eggs, which she deposits in the sand, leaving them to be hatched by the heat of the sun. Were it not for their great fecundity the species would soon be destroyed.

CHAMFORT, or **Chamfort**, **Sébastien Roch Nicolas**, a French author, born near Clermont, in Auvergne, in 1741, died in Paris, April 13, 1794. He received a superior education, became successively a lawyer's clerk, a tutor, and secretary of a gentleman of Liège, and a writer for the *Revue encyclopédique*. He had to contend with many difficulties till 1764, when the successful performance of his comedy *La jeune Indienne* improved his prospects. His play *Le marchand de Smyrne* (1770) is regarded as his masterpiece, though his tragedy *Mustapha et Zéangir* (1776) was more successful, chiefly owing to the partiality for it of Louis XVI., and particularly of Marie Antoinette; and a pension of 1,200 livres was granted him, besides a salary of 2,000 livres as secretary of the prince of Condé. He soon resigned the latter employment to join Mme. Helvétius at Auteuil, who had befriended him during his early struggles. After having won several academical prizes, and one for the best *éloge* on La Fontaine, instituted by Necker in the hope that La Harpe, who was among the competitors, would win it, Chamfort was admitted to the academy in 1781. He afterward became reader to Madame Élisabeth, for whom he prepared a commentary on La Fontaine's fables. Smarting to some extent under the patronizing manners of French princes and nobles toward men of letters in their employ, he sympathized with the revolution, and the title of the pamphlet of Sieyès on the *tiers état*, as well as the saying *Guerre aux châteaux, paix aux chaumières*, and other pithy utterances, have been ascribed to him. He prepared for Mirabeau his *Discours sur les académies*, and also assisted Talleyrand in some of his reports. But subsequently he was frightened by the excesses of

the terrorists, and defined the doctrine of equality as signifying *Sois mon frère ou je te tue*. Placed under arrest, he was released after a few days and resumed the directorship of the national library, to which he had been appointed. His arrest being again determined upon, he inflicted serious wounds upon himself while attempting to blow out his brains and to cut his throat with his razor, declaring that he would rather die by his own hand in the full enjoyment of his liberty than submit to the slavery of a dungeon. He was restored to health, but a relapse ended his life. Mirabeau called him *une tête électrique*, and Grimm, Chateaubriand, and Sainte-Beuve all refer to his influence. M. Auguis published the most complete edition of his works, with a notice of his life and writings (5 vols., Paris, 1824-'5). See also *Œuvres de Chamfort*, by Arsène Housaye (1852), and *Pensées, maximes, anecdotes, dialogues*, with a biography of Chamfort, by P. J. Stahl (new enlarged ed., with letters from Mirabeau to Chamfort, 1860).

CHAMISSO, Adalbert von, or Louis Charles Adolphe de Chamisso de Boncourt, a German poet and naturalist, born at Boncourt, France, Jan. 27, 1781, died in Berlin, Aug. 21, 1838. He went in his boyhood to Berlin, where he became a page of the queen of Prussia, and studied at the French gymnasium. He was a lieutenant from 1798 to 1806, when he returned to France; but he went again to Berlin in 1811 to study natural history. He accompanied Otto von Kotzebue as naturalist in Count Rumiantzeff's expedition around the world, 1815-'18, was subsequently employed in the botanical garden in Berlin, and was a member of the academy of sciences. He wrote the famous story of *Peter Schlemihl* (1814; 9th ed., Hamburg, 1867; new illustrated ed., 1868), which has been translated into the principal foreign languages. Among his *Gedichte* (17th ed., Leipzig, 1861) are many poems which gave him a foremost rank among the lyrical poets of his country. They fill the 3d and 4th volumes of his *Gesammelte Werke* (6 vols., 1836-'9; 5th ed., 1864), the first two volumes containing his *Reise um die Welt*, and the 5th and 6th his biography and correspondence. His other publications include another work on his travels, one relating to botany, and one upon the Hawaiian language. With Varnhagen von Ense he edited for some time the *Musenalmannach*.

CHAMOIS, or *Gems* (*Antilope rupicapra*, Pallas), the mountain or Alpine antelope of Europe, and the only animal of that geographical division which partakes in any degree of the character of the antelopes. It is found in the Pyrenees, the Alps, the Carpathian and Grecian mountains, the Caucasus and Taurus ranges, the heights of the Himalaya, and perhaps in other situations of similar character. The chamois is rather more than 3 ft. in length, and a little above 2 ft. in height. Its smooth black horns are about 6 in. long, rising nearly perpendicularly from the fore part of the brow,

abruptly hooked backward at their extremities, and nearly parallel through their entire extent. It is beardless, but the body is covered with a short thick fleece of fine wool, to protect the animal from cold, and also with long and silky hair of a deep brown color in winter, brown fawn color in summer, and slightly mixed with gray in spring. The head is silvery yellow, the inside of the thighs and ears white, and the tail black. A small black band winds from the corner of the mouth around each eye. The kids are of a deep yellow color. Impatient of heat, the chamois remains in the summer on the loftiest ridges, or in snowy valleys, clipping for its food the mountain herbs and the tender shoots of shrubs, and rarely drinking. It is remarkable for its agility, and for its keenness of sight and smell. It scents a man at a long distance, is at once thrown into great agitation, and flies at its utmost speed on his first appearance. It bounds from rock to rock with an admirable grace, and ascends and descends

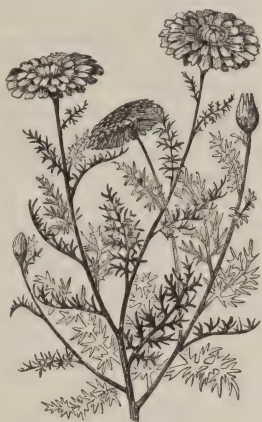


Chamois (*Antilope rupicapra*).

cliffs which few other animals would attempt. It is more closely allied to the prong-horn (*antelope Americana*) than to any other species of antelope. The structure and form of their horns are nearly similar; and the pelage of each of the two animals is peculiar, though not identical. It is, in some respects, a connecting link between the true antelopes and the goats, although far more closely allied to the former. The chamois is easily tamed, and becomes very familiar and fond of the persons who feed it. The venison is but moderately good, bearing some resemblance to that of the roebuck, but inferior in flavor and quality. The skin is dressed into a fine light leather, in use for under garments, and for cleaning plate, glass, and the like; though but a small quantity of what is sold as chamois, or, as it is usually termed, shammy leather, is actually made from the hide of this animal.—Of all sports, the pursuit of the chamois is the most difficult and perilous.

It is also the least profitable, so rare is the beast becoming even in his most difficult and remotest haunts, so small are the chances of success, and so little the value of the game when taken.

CHAMOMILE (Gr. *χαμαί*, on the ground, and *μήλον*, apple; *anthemis nobilis*, Linn.), a plant of the family *compositæ*, indigenous in the south of England, and widely cultivated in gardens for medicinal use. Its leaves and daisy-like flowers emit a strong perfume when trodden upon. The flowers have long been famous as an aromatic bitter. A tepid infusion of them, known as chamomile tea, is often employed as an emetic. They are used externally as fomentations in colic and intestinal inflammation.



Anthemis nobilis.

Chamomile is naturalized in many parts of Europe, and in the state of Delaware. *Anthemis cotula*, wild chamomile, and *matricaria chamomilla*, German chamomile, a plant of the same family, have similar properties.

CHAMORRO, Fruto, a Central American statesman, born in Guatemala in 1806, died March 12, 1855. He belonged to an old and wealthy Spanish family, but joined the national cause and became a member of the legislature of Nicaragua and of the constituent assembly, and a senator (1838-'42); and when in 1843 an attempt was made for a partial confederation of San Salvador, Honduras, and Nicaragua, he was chosen supreme delegate with executive power. He retired in 1844, after having averted a war declared against Guatemala. Subsequently he became civil and military governor of S. Nicaragua, and in 1851 secretary of the treasury; and after the outbreak in August which drove Pineda from power, he succeeded him as general-in-chief.

He was chief magistrate, or supreme director, in 1853-'4, and was defeated by a body of insurgents, and besieged for nearly 300 days at Granada, the besiegers retiring Feb. 10, 1855.

CHAMOUNI, **Chamouny**, or **Chamonix**, a picturesque Alpine valley of France, between the Graian and Pennine Alps, in the department of Haute-Savoie, over 3,000 feet above the Mediterranean, and about 2,000 feet above the lake of Geneva, watered by the river Arve. It is more than 13 m. long and 2 m. broad, and is bounded N. by Mont Brévent and the Aiguilles Rouges, N. E. by the Col de Balme, S. W. by Monts Lacha and Vandagne, and S. by the chain of Mont Blanc, whence rise enormous glaciers. The largest of these, the Mer de Glace, is broken by many deep crevices disclosing the remarkable purity and deep blue coloring of the frozen mass. The winter, which lasts from October to May, is very severe; snow lies three feet deep in the lowest part, and the routes over the mountains are altogether impassable. The short summer, however, is warm. In July commences the dangerous labor of driving cattle across the Montanvert and the Mer de Glace, to pasture on the mountains beyond; and the occasion is made a holiday. One man is left on the other side of the glacier, to guard the cattle till autumn. The soil, though naturally barren, yields when carefully cultivated good crops of grain and fruit, and affords pasturage for cattle. The rearing of bees is one of the principal industries of the valley, and the white aromatic honey of Chamouni is renowned. Fancy articles of carved wood are manufactured, and the inhabitants are also engaged in spinning and weaving. Numerous excursions are made from Chamouni to the Montanvert, leading to the Mer de Glace; to the Pierre Pointue and glacier des Bossons, the Flégère, and the Brévent; to the Jardin, a flowery island in the midst of a sea of ice; to the



Chamouni, with Mont Blanc in the distance.

Grands Mulets, and to Mont Blanc. The finest views of the latter mountain chain, of Mont Maudit and Mont Blanc du Tacul, and other conspicuous scenery, are from the Bré-

vent, and from the Flégère, the peak of the former mountain. About 300 horses and mules and many skilled guides are at the disposal of tourists, under strict regulations of the authorities and of the Alpine clubs. The first recorded visit to this region is that of a bishop of Geneva in 1443. Philip of Savoy, count of Geneva, licensed fairs here in 1530; and the mountains have been explored occasionally by Swiss and Germans. But the glaciers inspired so much dread that the valley was believed to be covered with snow in order to punish the inhabitants for their sins; and they were styled *les montagnes maudites*, the accursed mountains. In 1606 St. Francis de Sales visited the valley, which was within his diocese of Geneva. In 1741 the attention of the English was attracted to the region by the reports of Wyndham and Pococke; and an inscription on a block of granite, popularly known as the English stone, on the spot near the Mer de Glace, where these travellers were erroneously supposed to have passed the night, having been accidentally destroyed, has been restored on Mont Montanvert. De Saussure made his first visit to the valley in 1760, and Bourrit in 1775. In December, 1859, Tyndall explored the Mer de Glace, and crossed the channels of its avalanches in the deep snow, encountering perils which are great in winter, although in summer the passage is comparatively safe. There are several villages in the valley, with an aggregate population of about 2,000. The principal of these is Chamouni, on the right bank of the Arve, about 22 m. S. E. of Bonneville, at the foot of Mont Blanc. The distance to the nearest railway station, at Martigny, is about 22 m., which may be traversed on mules in nine hours by the passes of the Tête Noire or the Col de Balme. The village is also known as Le Prieuré, from a Benedictine priory established by a Genevese count, with the sanction of Pope Urban II., toward the close of the 11th century. An English chapel was opened in 1860. In August and September the place is overcrowded with visitors, and presents a bustling appearance. Flax and honey are exported, and there are a mine of anthracite, called Du Coupeau, and mineral warm baths. The origin of the name Chamouni is traced to *champs munis*, or fortified grounds, in allusion to the natural fortifications formed by the mountains.

CHAMPAGNE, an ancient province of France, bounded N. by Belgium, E. by Lorraine, S. E. by Franche-Comté, S. by Burgundy and Nivernais, and W. by Orléanais, Ile de France, and Picardy. Capital, Troyes. For a long time it was governed by local princes, and was united to the crown of France in the 14th century. At present it comprises the departments of Aube, Marne, Haute-Marne, Ardennes, and part of the departments of Seine-et-Marne, Aisne, Yonne, and Meuse. It is chiefly celebrated for its wines, containing about 125,000 acres of vine-growing land.

The present department of Marne, however, alone produces what is technically known in commerce as champagne wine. The department of Ardennes produces a common red wine, which is exclusively consumed by the inhabitants. The best of it is wanting in body, spirit, and color, and will not bear exportation or keeping. Of the product of the department of Haute-Marne, about one half is consumed at home, the remainder being sold in the vicinity. The quality of these wines is superior to those of Ardennes. The department of Aube produces a red wine, the larger portion of which is reserved for home consumption. The better classes of wine are strong-bodied and heady, requiring to be kept at least two years before they are fit for use. Some excellent white wines are produced here. The department of Marne has about 46,000 acres of vineyards, which produce red and white wines, one third of which, principally the former, is consumed within the department, the rest forming one of the great staples of the commerce of the district. The arrondissements of Rheims and Épernay contain the most celebrated vineyards. (See FRANCE, WINES OF.)

CHAMPAGNE, or Champaigne, **Philippe de**, a French painter, born in Brussels, May 26, 1602, died in Paris, Aug. 12, 1674. In 1621 he went to Paris, where he became a friend of Nicolas Poussin, superintendent of one of the royal galleries, and a successful portrait and landscape painter. His portraits, especially one of himself, are remarkable for the characteristic excellence of coloring of the Flemish school. Among the finest of his other works are those at the Carmelites, in Paris.

CHAMPAGNY. **I. Jean Baptiste Nompère**, count de, duke de Cadore, a French statesman, born at Roanne, Aug. 4, 1756, died in Paris, July 3, 1834. He belonged to a junior branch of an ancient family, studied under Laplace, distinguished himself in the naval service, and was severely wounded while serving under De Grasse, April 11, 1780. In 1789 he became a member of the states general, was arrested in 1793, but escaped, and entered the council of state in 1799. In 1801 he went as ambassador to Vienna, and in 1804 Napoleon made him minister of the interior. He was at the emperor's coronation in Milan in 1805, and received the portfolio of foreign affairs in 1807. In 1809 he was present at the battle of Wagram, and assisted in the treaty of peace which resulted in Napoleon's marriage with Maria Louisa. He urged the annexation of the Netherlands and of other territories to France. In 1811 he was dismissed from the ministry for having failed to comprehend Napoleon's designs against Russia. He adhered to Napoleon during the hundred days, although Louis XVIII. had made him a peer. In 1830 he supported Louis Philippe. His *Souvenirs* were published at Paris in 1846. **II. Louis Alix Nompère de**, duke de Cadore, eldest son of the preceding, born Jan. 12, 1796, died in

Boulogne in January, 1870. He entered the chamber of peers in 1835, but retired from politics on the fall of Louis Philippe. In 1861 he was French ambassador at Rome. He married a daughter of Count Lagrange.

III. François Joseph Marie Thérèse, count de, brother of the preceding, born in Vienna, Sept. 10, 1804. He coöperated with Montalembert and Beugnot in various publications, and in 1869 succeeded Berryer as a member of the French academy. His principal works are *L'Histoire des Césars* (4 vols., 1841-'3; 2d ed., 1853) and *Les Antonins* (3 vols., 1863; 2d ed., 1866). **IV. Napoléon Marie de Nompère**, count de, brother of the preceding, born in Paris, Oct. 29, 1806. Napoleon was his godfather. He became an advocate, but devoted himself to agriculture. He supported the second empire, and in 1851 was elected deputy for Morbihan, and reëlected in 1863 and 1869. He has published *Traité de la police municipale*, &c. (4 vols., 1844-'61). **V. Jérôme Paul de Nompère**, brother of the preceding, became a member of the legislative body for the department of Côtes-du-Nord in 1853, and was reëlected in 1863 and 1869.

CHAMPAIGN. I. A W. central county of Ohio, intersected by Mad river; area, about 390 sq. m.; pop. in 1870, 24,188. The surface is level or undulating, and the soil fertile. It is traversed by the Cincinnati, Sandusky, and Cleveland, the Pittsburgh, Cincinnati, and St. Louis, the Atlantic and Great Western, and the Springfield branch of the Cleveland, Columbus, Cincinnati, and Indianapolis railroads. The chief productions in 1870 were 724,360 bushels of wheat, 1,280,472 of Indian corn, 244,073 of oats, 74,277 of potatoes, 21,082 tons of hay, 344,401 lbs. of butter, and 169,060 of wool. There were 7,696 horses, 5,463 milch cows, 8,673 other cattle, 38,103 sheep, and 20,810 swine. There were 15 manufactories of carriages and wagons, 1 of agricultural implements, 5 of furniture, 2 of glue, 12 of saddlery and harness, 3 of sashes, doors, and blinds, 2 of woollen goods, 20 flour, 3 planing and 20 saw mills, 4 tanneries, and 2 currying establishments. Capital, Urbana. **II.** An E. central county of Illinois, comprising a part of the Grand Prairie, and watered by several streams; area, about 880 sq. m.; pop. in 1870, 32,737. The surface consists of an open plain of great fertility, interspersed with small clusters of trees. It is traversed by the Toledo, Wabash, and Western, the Chicago branch of the Illinois Central, the Indianapolis, Bloomington, and Western railroads, and a branch railroad from Urbana to Decatur. The chief productions in 1870 were 245,668 bushels of wheat, 45,752 of rye, 3,924,720 of Indian corn, 721,375 of oats, 266,918 of potatoes, 44,800 tons of hay, 35,273 lbs. of cheese, 716,430 of butter, 66,986 of wool, and 53,588 gallons of sorghum molasses. There were 16,529 horses, 8,565 milch cows, 18,516 other cattle, 17,313 sheep, and 36,384 swine. There were 15 manufactories of car-

riages and wagons, 2 of boots and shoes, 6 of bricks, 4 of furniture, 11 of saddlery and harness, 2 of sashes, doors, and blinds, 1 of woollen goods, 1 machine shop, 10 flour and 8 saw mills. Capital, Urbana.

CHAMP DE MARS. I. The name given to the annual meetings held by the Frankish tribes who took possession of Gaul during the 5th century. They were called in Latin *Plactia*, while the Frankish appellation was *Mâls*. These meetings were sometimes military reviews, or solemn national assemblies, where all the freemen among the Franks gathered to pay homage to the supreme chief of the nation; sometimes special assemblies of the lords and warriors, called by the king to consult upon some military expedition, or of the bishops, to take their advice upon some point of general policy, or adjust some interior difficulty. Under the first Carolingians the time of these meetings was changed from March to May, whence they were called *Champ de Mai*. **II.** The name of an immense oblong square, situated on the outskirts of Paris, between the *école militaire* and the Seine, and especially devoted to the drilling of troops and military pageants. It is 3,280 ft. long by 1,640 wide, is flanked by ditches faced with stone, has four rows of trees on each side, and is entered by five gates. The first great feast of the French revolution, the *fête de la fédération*, was celebrated here. On that occasion, the place not being ready, the population of Paris, of both sexes and all ranks, went to work by night and day, and completed it by the day, July 14, 1790. On July 17 of the following year the place was the scene of a great demonstration against the legislative assembly, which ended with a sanguinary dispersion of the crowd by Lafayette; in 1793, of the acceptance of the constitutional act voted by the convention; in 1794, of the feast of the Supreme Being, with Robespierre as its leading performer; in 1796, of the rejoicings on account of the taking of Milan by Bonaparte. On June 1, 1815, Napoleon held here the great assembly, known as the *Champ de Mai*, for the acceptance of the supplementary act to the imperial constitution. Here in 1827 the review was held in consequence of which the Paris national guards were disbanded by Charles X. The republican feast of agriculture and industry was celebrated here in 1848. Louis Napoleon distributed eagles here to the soldiers May 10, 1852, and made a speech to them which was regarded as a prelude to the formal establishment of the second empire. Here was held the universal exposition of 1867.

CHAMPE, John, an American soldier, born in Loudon co., Va., in 1752, died in Kentucky near the close of the 18th century. He was selected from Gen. Lee's regiment, by request of Washington, to go to New York as a deserter and spy, and if possible to seize and bring off Arnold after the execution of Major André. Champe undertook the enterprise, passed the American lines with difficulty, was

hotly pursued by his comrades as a deserter, reached New York, underwent an examination before Sir Henry Clinton, and by him was consigned to Arnold, who gave him in the British army his former rank of sergeant major. He discovered Arnold's habit of walking in his garden at a late hour every night, and formed a plan with a comrade to seize and gag him there, and to take him between them as a drunken companion to a boat on the Hudson, whence arrangements were made for his speedy transportation to the American headquarters. On the appointed night Arnold failed to appear in the garden, and Champe, after waiting for him till near morning, returned with chagrin to his position in the British army. It proved that Arnold had the day before changed his quarters, preparatory to the embarkation of his troops for Virginia. Champe embraced the first opportunity to escape to the American army, and joined the troops under Gen. Greene. Gen. Washington discharged him from further service, lest, falling into the hands of the enemy, he should be hanged. When subsequently Washington sought for him to reward him for his faithful and dangerous service, he learned of his recent death in Kentucky.

CHAMPERTY (Lat. *campi partitio*), an agreement between a party to a suit and some third person that the latter shall carry on the suit at his own expense, and in consideration thereof shall receive a portion of what is recovered therein in case of a successful result. It differs from maintenance in that in the latter case the question of compensation does not necessarily enter into the account. At the common law, not only was the agreement void, but the entering into it was a misdemeanor, and statutes were passed to punish cases analogous in character and in supposed mischief. Of late, however, the tendency has been to relax the old rules, from a conviction that, whatever may have been the case formerly, the evils that might flow from such bargains are rather imaginary than real. By statute in some of the United States it is legal for a party to make such bargain with his attorney as he may consider for his interest; and judicial decisions have modified the old rules considerably where no such statutes exist. It was a very ancient rule of the common law that chuses in action should not be assigned, the object of which rule was to prevent any champertious intermeddling with claims to be put in suit; but courts of equity long since recognized the right of the assignee, and no other effect of the rule remained except that it was required that a suit at law should be brought in the name of the assignor. But this has now been abrogated in a number of the states, and assignees may sue at law in their own names, subject, however, to all legal defences and offsets which existed against the claim in the hands of the assignor at the time of notice of the assignment.

CHAMPFLEURY, the popular name of **JULES FLEURY**, a French author, born at Laon, Sept. 10, 1821. He is the son of a municipal officer, became clerk in a publishing house in Paris, described his literary and journalistic struggles in *Confessions de Sylvius* and *Les aventures de Mariette*, wrote *Contes d'hiver, de printemps, d'été et d'automne*, and acquired fame by his *Chien-Caillou* (1847), and by his pantomimes, which led in 1863 to his becoming director of the Funambules theatre. In 1848 he was one of the founders of the *Événement* newspaper, and in 1849 he wrote *Les oies du Noël* for Proudhon's *Voix du Peuple*. Prominent among his numerous works is *Les bourgeois de Molinchart* (1854), a satire on provincial life, which placed him at the head of the realistic school. A collection of his writings was published in 1857 under the title of *Œuvres complètes* (partly republished in his *Œuvres illustrées*), which has since been increased by many volumes, including his *Histoire de la caricature antique et de la caricature moderne* (2 vols., 1865; new ed., 1872).

CHAMPION, a term derived from chivalry, and signifying one who undertakes to defend his cause by force of arms. Custom allows a wider latitude of application to the word. In the ruder stages of society, when might constituted right, the right was frequently submitted to such an arbitrament. The two elements which then chiefly entered into the social system, namely, religion and love of military glory, both inclined toward a ceremony in which God should be called to indicate the righteousness of the cause by success in the trial by battle. Accordingly, we find from the earliest ages of feudalism the trial by private combat recognized as a legal mode of settling disputes. The trial came gradually to be hedged in by formalities, until it was only appealed to in cases of grave import. It is obvious that in many cases of personal encounter the disputants must be so unequally matched that they could not be pitted against each other with any chance of a fair result; the law therefore permitted the plaintiff or the defendant in cases of accusation to name a proxy or champion. Appeal to combat could be made in court martial, that is to say, in cases coming under the jurisdiction of the court of chivalry or honor, in appeals of felony, and in certain cases upon issue joined in a writ of right. Ladies and minors, being disqualified by reason of their physical incapacity, prosecuted their claims by a champion. The champion usually challenged his opponent by casting down his glove, which the latter accepted by taking it up. Combat was then joined, and carried on to the death, or till stopped by the judges. Verdict was given for the victorious party. It is from this custom that our modern phrase is derived, "to appeal to the God of battles." Judicial combat appears to be of Gothic origin. William the Norman introduced it into England, where it was practised as late as 1638.

In the 13th year of Queen Elizabeth a trial of battle was fought by champions in Tothillfields, Westminster, on a writ of right. The custom was suppressed in France by St. Louis in 1270, but remained unrepealed on the English statute book to the time of George III., when a highwayman escaped from justice by claiming an appeal to wager of battle. In the ceremonies until recently in use on the coronation of the kings of England, a champion figured conspicuously. The championship of England is hereditary in the family of Dymocke, whose eldest male representative heir, armed *cap-à-pie* in the style of the middle ages, should ride into the ring, and throwing down his gauntlet dare any one to dispute the right of the sovereign to the throne. This portion of the ceremonial last occurred in 1821, at the coronation of George IV. William IV. and Victoria dispensed with it.—The knight who during a tournament had charge that insult or injury be not offered or done to the ladies assembled was also called a champion.

CHAMPLAIN, a N. W. county of the province of Quebec, Canada, on the left bank of the St. Lawrence; area, 229 sq. m.; pop. in 1871, 8,167, of whom 8,015 were French. It is traversed by the rivers St. Maurice, Champlain, Batiscan, and Vermilion, and copiously watered by small streams and lakes. The surface rises gradually from the St. Lawrence; the soil is fertile and the timber of excellent quality. To the ordinary agricultural products, this county adds tobacco and a considerable quantity of maple sugar. Chief town, Batiscan.

CHAMPLAIN, a township forming the N. E. extremity of Clinton co., New York, on Lake Champlain, and a village 5 m. S. W. of Rouse's Point; pop. of the township in 1871, 5,080; of the village, 1,850. The village is situated on Chazy river, which supplies it with water power, and is connected by the Ogdensburgh and Lake Champlain railroad with Rouse's Point and Ogdensburgh. It is comprised in Champlain collection district, and has some trade, which is carried on by the Chazy river. The village contains several churches, an academy, and manufactories of iron.

CHAMPLAIN, Lake, lies between New York and Vermont, and extends from Whitehall in the former state to St. John's in Canada. It is 126 m. long, and varies in breadth from 40 rods to 15 m. Its greatest breadth unobstructed by islands is about 10 m., at a point near Burlington, Vt. Its outline is very irregular, the shores being indented by numerous bays. Its depth varies from 54 to 282 ft., and the largest vessels can navigate its whole extent. The principal islands are North Hero, 11 by 2 m., South Hero, 13 by 4 m., and La Motte, 6 by 2 m.; these three, with several smaller ones and the peninsula of Alburg, all in the N. part, form the county of Grand Isle in Vermont. There are about 50 smaller islands. The principal rivers entering the lake are Wood creek, at its head, the outlet of Lake George, the Au

Sable, Saranac, and Chazy, from New York, the Otter, Winooski, Lamoille, and Missisque, from Vermont. The outlet of Lake Champlain is the Sorel or Richelieu river, sometimes called the St. John's, which empties into the St. Lawrence, and with the Chambly canal affords a passage for vessels of large size to the ocean. On the south it communicates, by means of the Champlain canal, with the Hudson river. Navigation is usually closed by ice about the end of November, and opens early in April. The waters abound with bass, pickerel, salmon trout, and other varieties of fish. This lake, filling a valley enclosed by high mountains, is celebrated for its magnificent scenery, embracing the Green mountains of Vermont on the east and the Adirondack mountains of New York on the west. Several pleasant villages and watering places, with one or two important towns, are situated on its shores, which comprise the collection districts of Burlington and Champlain.—Lake Champlain was discovered in 1609 by Samuel Champlain, whose name it received. It was the scene of important events in the early wars of the continent, and in 1814 of a considerable naval battle. At that time an invasion of the northern portion of New York was contemplated by the British, and a force of from 10,000 to 15,000 troops was collected in the vicinity of Montreal for that purpose. In such an expedition the command of Lake Champlain became an object of great moment, as it flanked the march of the invading army for more than 100 m., thus offering facilities for the transportation of reinforcements and supplies. The efforts of both nations were therefore directed to the creation of naval forces on the lake in the shortest possible time. The Saratoga, the largest American vessel, was built at Vergennes, and was launched on the 40th day after the first tree used in her frame was taken from the forest. In August, 1814, the English army, about 12,000 strong, commanded by Sir George Prevost, advanced along the western shore to Plattsburgh, which was held by Gen. Macomb with about 1,500 men. The American naval force, under Capt. Macdonough, was anchored in Plattsburgh bay; it consisted of 14 vessels of all classes, carrying 86 guns and about 850 men; the largest vessel was the Saratoga, 26 guns and 212 men. The British squadron, under Capt. Downie, consisted of 16 vessels, carrying 95 guns and about 1,000 men; the largest vessel was the Confiance, 37 guns and 300 men. At sunrise on Sept. 11 the British squadron came in sight, and by 8 o'clock approached the American fleet. Fire was opened by the Americans, which was not returned by the enemy until the Confiance had anchored at about 300 yards from the American line. The first broadside from the Confiance killed or wounded 40 men on board the Saratoga, nearly a fifth of her entire complement, and more than a third of the American loss during the action. The engagement now became general.

In an hour the whole starboard battery of the *Saratoga* was disabled. She was then winded about by means of kedges which had been laid from the bows, and her fresh broadside was brought to bear upon the *Confiance*, which had also suffered severely. The British vessel attempted to perform the same evolution, but without success, and after fighting about 2½ hours in all was forced to strike her flag. The fire of the *Saratoga* was then turned upon the brig *Linnet* of 16 guns, the second vessel of the enemy, which surrendered in a few minutes. The Chubb sloop of 11 guns had meanwhile struck to the *Ticonderoga* of 17 guns, and the Finch sloop of 11 guns had been crippled, and, drifting within reach of a single gun planted on a small island, also surrendered. These sloops had been captured from the Americans the year before. The 12 gunboats which made up the remainder of the British squadron also hauled down their flags, but presently made off and escaped, all the men on the American gunboats being required to keep the prizes afloat. The American loss in killed and wounded was 112; that of the British is estimated at from 173 to 204, exclusive of prisoners. Of the 95 guns which they brought into action, they lost all but 20. The American victory was mainly owing to the precaution of Macdonough in throwing out kedges from the bows of the *Saratoga*, so that when the guns in one broadside were disabled, she could be turned round and present a fresh broadside to the enemy. Her 26 guns were thus in this action practically equal to twice as many. In fact, with these, she actually outfought the *Confiance* and the *Linnet*, with 53 guns of fully equal calibre, having together twice as many men, but which could not, when one broadside was disabled, turn round and fight with the other. The British army under Prevost had in the mean time advanced upon Macomb's position at Plattsburgh. A feint was made in front, while a column was sent to ford the river above, and take it in the rear; but the column lost its way, and before the ford could be found the naval battle was over. The attack was at once abandoned, and under cover of night and a storm the British retreated in disorder, leaving behind their sick and wounded, and a part of their baggage and stores.

CHAMPLAIN, Samuel de, a French navigator, founder of Quebec and first governor of New France, born at Brouage, in Saintonge, in 1567, died Dec. 25, 1635. He was of a family long connected with the sea as fishers and mariners, his father being a ship captain. He evidently received a careful education as a navigator, but early in life entered the army and rose to the rank of quartermaster of cavalry in the army of Brittany against the league. His uncle was pilot general of the fleets of the Spanish king, and as such conducted back to Spain the troops who had served in France. Champlain went with him, and took command of the *St. Julien*, which sailed in January,

1599, for Mexico, as one of a Spanish fleet, returning to Spain in March, 1601. Of his voyage he drew up a faithful report, with views and charts. This *Bref discours* was printed for the first time at Quebec in 1870, although a translation had appeared in the publications of the Hakluyt society. On his return he received a pension from Henry IV., and was urged by the commander De Chaste, governor of Dieppe, to explore and prepare to found a colony in territories in North America which had been granted to him by the king. He accordingly sailed March 15, 1603, in the ship of Pontgravé, an experienced navigator of St. Malo. They anchored at Tadoussac, where the Saguenay enters the St. Lawrence, May 24. He then, with Pontgravé and a few men, ran up the river in a light boat till they were stopped by the sault St. Louis rapids above Montreal. He then returned to Tadoussac, carefully examining both shores of the river. While the Indian trade was going on, he explored the river St. Lawrence down to Gaspé, preparing a map, and collecting information as to mines said to exist in Acadia. He then returned to France, where in 1603 appeared his first volume, *Des sauvages*, giving an account of his exploration. His patron, the commander De Chaste, had died meanwhile, and his privileges had been transferred to Du Guay, sieur de Monts. Champlain was too important to be overlooked. De Monts made an engagement with him, and resolving to form a settlement in Acadia, they sailed together, and reached Sable island May 1, 1604. They then ran along the coast of Nova Scotia, and finally began a settlement on the island of St. Croix, in a river of the same name, between what is now Maine and New Brunswick. Finding it inconvenient, after wintering there they removed to Port Royal, near the present Annapolis. During the years 1604-6 Champlain explored the coast as far as Cape Cod, making careful surveys and maps. In 1607 he returned to France. Having suggested to De Monts the greater security of a post on the St. Lawrence, and its greater importance from its commanding the trade of a large inland territory he was sent out in 1608 with Pontgravé. After reaching Tadoussac he ran up the St. Lawrence, and arriving on July 3 at the place called Quebec, or the Narrows, by the Algonquins, he decided to make the settlement there. They had scarcely begun to clear the ground and build when a plot was formed by five wretches to assassinate Champlain and escape to a foreign ship at Tadoussac. This was happily thwarted, and the ringleader punished on the spot. In 1609 Champlain, who had gained the good will of the Montagnais on the St. Lawrence, joined them in an expedition against the Iroquois. A party of Algonquins and Hurons met them, and the combined force ascended the Sorel river to the Chambly rapids. Here Champlain sent back his boat and crew, and proceeding on in a canoe, entered and

named Lake Champlain. Meeting a large Iroquois force on the lake, both parties landed and threw up bulwarks of trees. They engaged next day, and Champlain, killing two Iroquois chiefs and mortally wounding another with his arquebuse, decided the day. The Iroquois fled, and were pursued by the allies, who killed and took many. By this step Canada became a party to the Iroquois war, which lasted with occasional intermissions till the end of the French rule. In September Champlain returned to France, leaving Pierre Chavin of Dieppe in command at Quebec. De Monts had lost some of his privileges, but not his zeal for exploring America. Champlain sailed back in March, 1610, with a number of mechanics. The Montagnais again called for his aid, which he gave, to obtain their coöperation in his explorations. An Iroquois force on the Sorel was attacked and their fort stormed, Champlain receiving a severe wound in the action. Hastening back to France again in 1611, he left Du Parc in his place, and married Helen Boullé, a girl of 12, who was then a Protestant, but who outlived him to die as an Ursuline nun. He made a short visit to Canada, but returned to France to labor for it there. De Monts had lost his influence, the merchants interested had grown tired of the expense, and the whole scheme of colonization was about to be abandoned. Champlain induced the count de Soissons to take the matter in hand, and that nobleman obtained a commission appointing him governor and lieutenant general of New France, Oct. 8, 1612. Champlain was appointed his lieutenant a week later, and received the same position under the prince de Condé, who shortly after succeeded to the rights of De Soissons. He sent over some vessels, but in 1613 sailed himself to explore the Ottawa, which one Vignau pretended to have ascended to a lake, and thence to the North sea, where he had seen the wreck of an English ship. He left St. Helen's island, near Montreal, so called in honor of his child wife, May 27, 1613; but on entering the Ottawa he soon discovered Vignau's fraud. Champlain however arranged better terms for the fur trade, and returning to France formed a trading company, and in 1615 brought over Père Denis Jamay and two other Recollect priests, with a lay brother, to attend to the spiritual concerns of the new colony. One of these, Père Caron, immediately set out for the country of the Hurons on Georgian bay. Champlain followed by the tedious Ottawa route, and taking command of a force entered the present New York territory to attack the palisaded town of the Entouehonoron, members or allies of the Iroquois league. Owing to the insubordination of his Hurons he was repulsed in his assault, and received two wounds in the knee and leg. He was carried back to their town, and on his recovery visited the Tionontates and Ottawas, and in the spring returned to Quebec and France. For

some years Canada languished, and Champlain was actively engaged on both sides of the Atlantic to save it from utter extinction. When the duke de Montmorency succeeded Condé in 1620, Champlain grew more sanguine, and brought over his young wife, who remained till 1624, often experiencing great hardship. The De Caens, merchants, had now acquired the trade; Quebec was fortified and began actually to increase, when the duke de Ventadour in 1625 acquired the viceroyalty, and went energetically to work to build up Canada, and sent over the first Jesuit missionaries to aid the Recollects in winning the natives to Christianity. A new danger menaced the struggling colony. In July, 1628, an English fleet under David Kirke and his two brothers, born in France though of English origin, summoned Champlain to surrender Quebec. His answer was so bold that Kirke retired after committing some depredations. The Canada company, formed by Cardinal Richelieu, had just sent out settlers and provisions. On these Champlain depended, but Kirke intercepted and captured the fleet; and Champlain, after wintering at Quebec in great distress, surrendered to Louis and Thomas Kirke July 19, 1629. He was nearly recaptured on his way down the St. Lawrence by Emery de Caen, but was carried to England, and subjected to some harsh treatment. By the treaty of St. Germain-en-Laye, concluded in 1632, Canada was restored; and Champlain, reinstated as governor, sailed from Dieppe in 1633, with three vessels, well equipped. He was welcomed by the settlers and the Indians. The Jesuit missionaries resumed their labors among the Indians, while he did all in his power to develop the colony and strengthen it against future attack, establishing a post on Richelieu island, and founding Three Rivers. He did not long survive, dying two years after his arrival, and leaving Bras de Fer de Châteaufort to direct the colony till the arrival of a new governor. —Champlain, apart from his merits as a discoverer, was a noteworthy man. His zeal for the propagation of Christianity was great. A saying of his is preserved, that the salvation of one soul is of more importance than the founding of a new empire. While in Canada he devoted himself wholly to the duties of his position, and apparently with a single eye to benefit his patrons. Although traffic with the Indians was very lucrative, he never engaged in it. His views of justice were stern and upright, yet tempered with mercy. He has been accused of credulity in repeating the stories told him by the Indians, but he does not express his own belief in them. Besides the volume *Des sauvages*, in 1603, he published *Voyages* in 1613, with very valuable charts of the New England coast; *Voyages*, 1619 (reprinted 1627); and in 1632 a volume containing a very badly executed abridgment of the previous voyages, without their valuable maps, and a continuation from 1619. The volume contains

also a catechism in Huron, and prayers in Montagnais. Some copies bear date 1640. It was reprinted at Paris in 1830, without maps. As scholars required all the voyages to know what Champlain really wrote, two clergymen of Quebec, the abbés Laverdière and Casgrain, well known for their historical studies, in 1870 published the whole series, including his Mexican voyage, in 6 vols. 4to, with notes and facsimiles of all the maps and illustrations. There is also in the *Mercurc Français*, vol. xix., his account, apparently, of the voyage of 1633.

CHAMPLIN, Charles Josuah, a French painter, born at Les Andelys, June 6, 1825. He studied under Drolling, produced his first work, a female portrait, in 1845, and subsequently succeeded in delineations of Auvergnese mountaineers, and in portraits and fancy pictures. His "First Roses," representing a semi-nude girl with fresh roses on her lap, attracted much attention in 1857, and was purchased for the Tuileries; and he was employed in 1860 in decorating that palace, and afterward the flower saloon and the bath room of the empress Eugénie in the Élysée. The excessive realism of his female figures led to the exclusion of his famous *Aurore* from the exhibition of 1859. Napoleon III. subsequently authorized the publication of an engraving of it.

CHAMPMESLÉ. I. Marie Desmarest, a French actress, born in Rouen in 1644, died at Auteuil in 1698. Her father, the son of a president of the parliament of Normandy, being disinherited on account of his *mésalliance*, and obliged to engage in business, she took to the stage, married an actor, and in 1669 went with her husband to Paris, where the reputation they had acquired in Rouen was increased by their performances. In 1670 she personated Hermione at the hôtel de Bourgogne, and Racine, at first skeptical, became so delighted with her pathetic genius, that he gave her instruction in acting, caused her to play the principal characters of his tragedies, became her lover, and was said to have written *Phèdre* for her. She was as celebrated for her beauty and amiability as for her genius and amours. The wits and courtiers thronged her house, and one lover succeeded another. Boileau, while extolling her genius, satirizes her as Claudia; and when Racine was supplanted by the count de Clermont-Tonnerre, the wags said that her passion for the great dramatist had been *déracinée par le tonnerre*. She performed at the Comédie Française from the time of the foundation of the theatre in 1680 till a little while before her death. **II. Charles Chevillet**, popularly known as Champmeslé, husband of the preceding, a French playwright and comedian, born in Paris in 1645, died in 1701. He was the son of a tradesman, and after his marriage he acquired some fame as a comedian, especially in ridiculing the class of society from which he sprang. He was a friend of La Fontaine, and was believed to have coöperated

with him in writing plays. The most noted of his own productions was *Le Parisien*, a comedy performed in 1682, the success of which was mainly due to the performance by Madame Guérin, the widow of Molière, of one of the principal parts. Notwithstanding his wife's unfaithfulness, he retained his love for her, and died suddenly while he was having the anniversary of her death commemorated in the church.

CHAMPOLLION - FIGEAC, Jacques Joseph, a French archæologist, born at Figeac in 1778, died in the palace of Fontainebleau, May 9, 1867. He was at first librarian of the public library and professor of Greek literature at Grenoble. In 1828 he removed to Paris, being appointed professor at the *école des chartes*, and keeper of the manuscripts in the royal library, which office he retained till 1848. In 1849 he was appointed librarian at the palace of Fontainebleau, and remained in that office till his death. He edited many valuable manuscripts connected with the history of France, most of them under the patronage of the government or the French historical society; aided Sylvestre de Sacy and Dacier in several important publications; and superintended the unfinished publications of his brother, especially the *Grammaire égyptienne*, the *Dictionnaire hiéroglyphique*, and the *Voyage en Égypte*. In 1864 he completed, in 76 folio plates, his *Monographie du palais de Fontainebleau*. His subsequent works include *Le palais de Fontainebleau*, &c. (2 vols., 1867), and *Documents paléographiques relatifs à l'histoire des beaux-arts et des belles-lettres pendant le moyen âge* (1868).—One of his sons, AIMÉ CHAMPOLLION, has published a series of biographies and historical works, including *Louis et Charles d'Orléans*, &c. (2 vols., 1844).

CHAMPOLLION LE JEUNE, Jean François, a French Egyptologist, brother of the preceding, born at Figeac, Dec. 23, 1791, died in Paris, March 4, 1832. He studied so diligently under the direction of his brother that he permanently injured his left eye. His introduction to a new geographical work on Egypt (1807) increased the reputation which previous scientific disquisitions had established for him among the eminent orientalists of Paris, under whose guidance he perfected his acquirements. He commenced his studies of hieroglyphics in 1808, discovered the 25 Egyptian letters mentioned by Plutarch, and used them so skilfully in transcribing Coptic writings, that a member of the academy published them as an Egyptian work of the Antoninian period. In 1809 he became professor at the newly established university of Grenoble, when he began to announce and partly to publish the results of his researches, which made him celebrated as the founder of Egyptology, and especially of the science of hieroglyphics. The political events of 1815 led him to retire from his chair till 1818, when he resumed for a time his lectures on history and geography. Soon afterward he

went to Paris, where he read before the academy his dissertation *Sur l'écriture hiératique et démotique*, and his *Analyse méthodique du texte démotique de Rosette*, which Sylvestre de Sacy praised as prodigious efforts of learning and genius. In 1822 he read before the academy of inscriptions his celebrated disquisition, afterward published under the title of *Lettre à M. Dacier*, which proved his discovery of the hieroglyphical alphabet, both Arago and De Sacy deciding in favor of Champollion's priority of discovery as against Thomas Young, whose English partisans have claimed this honor for him. His subsequent expositions of the figurative, ideographical, and alphabetical systems of hieroglyphics was published in 1824 by the French government, under the title of *Précis du système hiéroglyphique des anciens Égyptiens*. In the same year, after examining the collection of the French consul at Turin, subsequently acquired by the king of Sardinia, he announced the discovery of the celebrated royal or chronological papyrus. He next visited Rome and Leghorn, and his report, made at the instance of the duke de Blacas, on the Egyptological collection of Henry Salt, the English consul at the latter city, led to its acquisition by the museum of Paris. He returned to Rome, where he described the Turin collection in his *Lettres à Monsieur le duc de Blacas* (2 vols., Paris, 1824-'6); and successfully applying his system to the interpretation of the monuments at Naples and Florence, he prepared the catalogues of the royal collection. Pope Leo XII. requested him to prepare a new work relating to the obelisks of Rome, but of this only the designs were published, the Latin work on this subject brought out in 1842 being spurious. Soon after the establishment of the Egyptian museum at the Louvre (1826) he became its director and lecturer, and his classification was adopted in other museums of the kind. He exposed the fallacies of Klaproth and other savants, and summed up in 1827 the result of previous investigations in his *Aperçu des résultats historiques de la découverte de l'alphabet hiéroglyphique*. Charles X. gave him the entry to his court by appointing him officer of the royal household, placed a frigate with seven draughtsmen and an architect at his disposal for the exploration of Egypt and Nubia (1827-'30), and in 1831, after the accession of Louis Philippe, the chair of Egyptian archaeology was created for him at the collège de France. He retired to a country seat to compose his *Grammaire égyptienne* (1836-'41), which became a standard work for that science, and his *Dictionnaire égyptien* (1842-'4). The letters to his brother during his Egyptian journey were published in 1835. He proposed to make his personal observations the basis of a comprehensive work, but lived only to publish the prospectus. After an attack of apoplexy at the close of 1831, he foresaw his speedy end, and employing January and February of 1832 in revising his Egyptian grammar, he handed the

work to his brother, saying that he hoped posterity would accept it as his visiting card. His death was mourned not only on account of his labors, which, as Chateaubriand said, "will be remembered as long as the immortal monuments which they revealed," but also on account of his great virtues. A monument was erected to him at Figeac, with inscriptions prepared by the institute. His bust was placed in the museum of Versailles, and copies of it were executed for the towns of Figeac and Grenoble; and his memory is perpetuated by an inscription in the royal museum of Turin. His MSS. were purchased by the French government, and edited under the supervision of his brother (1834-'48). After his death appeared *Monuments de l'Égypte et de la Nubie* (4 vols. 4to, 1835, with 400 folio plates); *Mémoires sur les signes employés par les anciens Égyptiens à la notation des divisions du temps* (1841); and fragments of *Notices descriptives* (1844).

CHANCEL, that portion of a church specially occupied by the clergy, and usually separated from the nave and aisles by screens made of carved stone or oak. The screen which separated the chancel from the nave was formerly called the rood screen, because a rood or large crucifix was usually placed on it, accompanied with two figures representing St. John and the Virgin Mary. In the chancel were situated the high altar, the *sedilia*, or seats for the officiating clergy, and the *piscina*, in which the water used for washing the hands of the celebrant was poured. It was usually surrounded with carved seats or stalls, which were occupied by the clergy not engaged in the services. These were also used when the office was sung in choir, a lecturn being placed in the centre of the chancel. The stalls were usually enriched with carvings, and had canopies of carved oak placed over them. The chancel in Gothic buildings occupies the place of the apsis in the ancient basilicas, and was called so from the *cancelli* or rails which were used in the early churches to separate the clergy from the laity.

CHANCELLOR, a law officer known to the polity of several countries. The derivation of the title is uncertain. It has been derived by Coke from the right of cancellation of patents and other royal grants, inherent in this officer, for misrepresentation of facts or on other grounds. But the word chancel would point to a more ancient derivation. The *cancellarius* of the Roman courts was simply a doorkeeper, or usher, to keep back the people who pressed rudely forward to the *cancelli*, or railings. The doorkeeper afterward became chief scribe, an official which the Roman church borrowed from the Roman empire, and still retains in the bishop's chancellor. The function of the chancellor of Great Britain is thus described by Blackstone: "When the modern kingdoms of Europe were established upon the ruins of the empire, almost every state preserved its chancellor, with different jurisdictions and dignities, according to the different constitutions,

But in all of them he seems to have had the supervision of all charters, letters, and such other public instruments of the crown as were authenticated in the most solemn manner, and therefore, when seals came into use, he had always the custody of the king's great seal; so that the office of chancellor, or lord keeper, whose authority by the statute of Elizabeth is declared to be exactly the same, is with us created by the mere delivery of the king's great seal into his custody, whereby he becomes, without writ or patent, an officer of the greatest weight and power of any now subsisting in the kingdom, and superior in point of precedence to every temporal lord. He is a privy councillor by his office, and prolocutor of the house of lords by prescription. To him belongs the appointment of all justices of the peace throughout the kingdom. Being formerly an ecclesiastic, for none else were then capable of an office so conversant in writing, and presiding over the king's chapel, he became keeper of the king's conscience, visitor in right of the king of all royal hospitals and colleges, and patron of all the king's livings under the value of 20 marks (or £20) per annum. He is the general guardian of all infants, idiots, and lunatics, and has the general superintendence of all charitable uses in the kingdom, and all this over and above the vast and extensive jurisdiction which he exercises in his judicial capacity in the court of chancery." The chancellor of England is a member of the cabinet, and as such retires on a change of ministry. This union of judicial and political functions was always an impediment to justice, and, as the public business takes precedence, gave rise to great inconvenience in the business of the court. By act of parliament passed in 1851, the chancellor was relieved of a considerable part of his judicial duties by the appointment of two lords justices, who together with the chancellor constituted a court of appeals for the review of cases brought from the vice chancellors and master of the rolls, all causes being heard in the first instance by the officers last named, or any two of them. The jurisdiction of the several courts of chancery is now transferred to and merged in that of the supreme court of England, created by act of Aug. 5, 1873. (See CHANCERY.) The chancellors of England have usually been distinguished for great legal attainments as well as political weight. Lords Eldon, Brougham, Cottenham, and St. Leonards have been the most distinguished of the present century. The last named chancellor (formerly known as Sir Edward Sugden) had an important part in the measures for the reform and improvement of the court of chancery. During a temporary vacancy in the office of chancellor, or when the chancellor is incapacitated from the performance of his duties, the great seal is put in commission; that is, intrusted to commissioners, who perform the duties of the office. The legal style of the chancellor is lord high

chancellor of Great Britain, and he takes precedence next to the archbishop of Canterbury, and above all dukes not of the blood royal. He has a salary of £10,000, with a retiring pension of £5,000. The office of chancellor of Scotland was abolished on the union of the two kingdoms. The lord high chancellor of Ireland has an authority within that kingdom corresponding in most respects to that of the lord high chancellor of Great Britain. His salary is £8,000, with a retiring pension of £3,692. The chancellor of the duchy of Lancaster has local equity jurisdiction.—The chancellor of the exchequer in Great Britain is under treasurer and the principal minister of finance. As such he is a member of the cabinet. Formerly he had judicial duties in connection with the court of exchequer, but these are now nominal. The chancellor of Oxford or Cambridge is the chief officer of those collegiate bodies. He is elected, and his office is honorary, the duties being discharged by the vice chancellor. The chancellor of a bishop sits in the consistorial court, and is theoretically the bishop's assessor and legal adviser. Various orders of knighthood have an officer called chancellor, and there is also the chancellor of a cathedral, who superintends the regularity of religious services.—In continental Europe there are various political as well as ecclesiastical officials styled chancellors. The chancellor of France was one of the highest officials of the old monarchy. The office was closely analogous to that of England. The chancellor was president of the great council and of the parliaments, drew up ordinances and letters patent, and held the royal seals. It is connected with the illustrious names of Duprat, De l'Hôpital, Birague, Maupeou, Malesherbes, and other distinguished jurists. Louis XV. held the seals himself for a time; and in 1757, the censorship having been associated with the other duties of the office, the virtuous Malesherbes, deeming executive and police duties incompatible with the purity of the judicial office, resigned. It was abolished in 1790, and revived for a short time by Napoleon, merely that his court might be graced with the title, for the functions were not restored. Revived under the restoration, it was finally abolished in 1838.—Only a few of the United States ever established the office of chancellor. In New York it existed until 1848, and was filled by able jurists, of whom James Kent is most celebrated. In some of the other states the office was also filled with marked ability, but it is retained now only in New Jersey and Delaware, though in Alabama, Mississippi, and Tennessee there are district chancellors, chosen by popular vote. The duties of the office where it exists in the United States are purely judicial.

CHANCELLORSVILLE, Battle of, fought in Spottsylvania county, E. Virginia, May 2-4, 1863, between the Union army of the Potomac under Gen. Hooker, and the confederate army

of North Virginia under Gen. Lee. Hooker replaced Burnside in command of the army of the Potomac, Jan. 26, 1863. He found it somewhat demoralized by the defeat at Fredericksburg and by dissensions among its principal officers, but by the middle of April he had brought it to a high state of efficiency. It numbered 132,000 men, of whom 13,000 were cavalry. It was divided into seven corps, under Reynolds, Couch, Sickles, Meade, Sedgwick, Howard, and Slocum, the cavalry being under Stoneman. It lay in camp on the left bank of the Rappahannock, opposite Fredericksburg. The confederate army was intrenched on the heights across the river. It was divided into the corps of Longstreet and Jackson, but Longstreet himself, with three of his five divisions, had been sent to North Carolina, so that there remained 62,000 men, of whom 3,000 were cavalry under Stuart. The position was thought to be unassailable in front, and Hooker undertook to turn its left flank, and so fall upon its rear. In the mean while he sent all his cavalry, with the exception of 1,000, upon an expedition to cut the communications of the enemy with Richmond. On the morning of April 27 a column 36,000 strong, which comprised the greater part of the corps of Meade, Howard, and Slocum, moved up the left bank of the Rappahannock 27 m. to Kelly's ford, beyond the extreme confederate left, where they crossed without opposition. Meade then moved down the opposite bank 10 m. toward the United States ford, brushed away three brigades which defended it, so that Couch, who was waiting on the other side with 12,000 men, crossed, and the four corps moved by different roads toward Chancellorsville, which had been designated as the place of rendezvous. They were in light marching order, encumbered with little artillery or baggage, the ammunition being carried by mules; and before the night of the 30th 48,000 men had reached Chancellorsville, and Sickles with 18,000 more was only a few hours' march behind. So successfully had the movement been conducted, that Hooker was justified by every military consideration in declaring that "the enemy must either ingloriously fly or come out from behind his intrenchments and give us battle on our own ground, where certain destruction awaits him." Chancellorsville was a solitary brick mansion, surrounded by a few outbuildings, standing in a clearing on the verge of a wild region known as the Wilderness. The tract, 10 or 15 m. in extent each way, had formerly been covered with a heavy forest. This had been cut down to supply fuel for the iron furnaces, and the soil being too poor to repay cultivation, a dense growth of dwarf pines, scrub oak, chinquapins, and brambles had sprung up. The surface was varied by low ridges, swampy intervals, and muddy brooks. Here and there was a solitary church, tavern, or farm house, each in a little clearing. Two main roads traverse the Wilderness from E. to W. These,

coming from Culpeper and Orange Court House, unite near Chancellorsville, and after two or three miles again diverge, both running toward Fredericksburg, 11 m. E. of Chancellorsville. The other roads are little more than wood paths. The battle of Chancellorsville was fought near the eastern border of this tract; that of the Wilderness, a year later, about 10 m. to the west. Sedgwick and Reynolds had crossed the Rappahannock below Fredericksburg, and were making a threatening demonstration on the confederate front, and it was not till the evening of the 30th that Lee was aware that his left flank had been turned, and that Hooker was in his rear, with a force fully equal to his own. Directing Early with 10,000 men to hold the heights of Fredericksburg, he at once called up Anderson from the left, and ordered Jackson to march from the extreme right. Jackson's main force was 20 m. distant. He began to move at midnight; at 8 o'clock the head of his column began to come up to Anderson, and by 11 on Friday morning, May 1, all had arrived, and were drawn up in line of battle in front of the Wilderness, out of which the enemy was now beginning to move. Hooker had done much, but he had omitted the one thing which would have insured success. An hour's march, the evening before or this morning, would have taken him unopposed out of the Wilderness and into the open country. But now, at noon, as his columns debouched by different roads, they found the enemy advancing in force; and, in opposition to the opinion of every one of his generals who had touched the enemy, he fell back again into the Wilderness. "The passageway," he says, "was narrow; I was satisfied that I could not throw troops through it fast enough to resist the advance of Gen. Lee, and was apprehensive of being whipped in detail. Accordingly, instructions were given for the troops in advance to return and establish themselves on the line they had just left, and to hold themselves in readiness to receive the enemy." The enemy, barely 50,000 strong, had come out of his intrenchments, and Hooker with more than 60,000 retreated before them from the ground which he himself had chosen, abandoned the offensive and assumed the defensive, while at the same time he had, 15 m. away, 56,000 more who were only hindered from falling upon what was now Lee's rear by the 10,000 left with Early. Hooker's defensive line was nearly in the shape of the letter C, the main front facing southward, the upper and lower curves looking west and east. The corps and divisions were somewhat broken up. Meade was on the left, nearest Fredericksburg, Slocum in the centre, Howard on the right. The corps of Couch and Sickles were mainly in reserve, but a division from each was thrust forward into the front line. Howard's position was weakly posted, being in military phrase "in the air;" but as the enemy were wholly on the left, hardly reaching to the centre, it was

thought safe. Skirmishers pushed into the woods informed Lee that the Union front was unassailable; but a cavalry reconnaissance disclosed the exposed situation of the Union right, and during the night Lee and Jackson resolved to attack there. To do this the confederate force must be divided. Jackson with 30,000 men was to move by a forest road around the Union position, while Lee with 20,000 kept up a show in front. Jackson moved at daybreak; a mile of dense forest shut him from the view of the enemy; only about 9 o'clock the road crossed a bare hill, over which the long column was plainly seen moving. It was clearly a movement in force, but its object was uncertain. The road just there ran southward, the direction which a retreat would probably take; but it might be for offence upon the right, and Howard was ordered to be on the alert, and especially to throw out pickets in his front. At 3 o'clock Jackson had accomplished his circuit of 15 m., which brought him within 6 m. of the point from which he had set out. He halted to form his men in an open space 2 m. to the west of Howard's position. Scouts creeping through the woods discovered the Union intrenchments unguarded; the arms were stacked, the men preparing their dinner. At 5 o'clock Jackson burst upon them down the road and through the woods on each side. The regiments on whom the shock first fell scattered without firing a shot, and the whole corps broke in disorder, and swarmed down the road to within half a mile of Chancellorsville. But the pursuers were checked from two quarters. All day Lee kept up a noisy demonstration on Hooker's front. Pleasonton, with two regiments of cavalry and a horse battery, had pushed a little into the woods, and finding nothing for cavalry to do was riding leisurely back. He came upon an open space, now filled with men, ambulances, and guns, the débris of a part of Howard's corps. The low under-wood was swarming with the enemy. He ordered one regiment to charge into the woods to check the pursuit for a few minutes, while with the other he brought up his horse battery, got a score of other guns into position, and had all of them double-shotted with canister and pointed low. The check given by the cavalry to the confederates was but momentary; they dashed straight toward the guns, but their line was swept back by the artillery; again and again they pressed on, and were again repelled, and at last fell back into the cover of the forest. As the Union line had been placed, Hooker had at Chancellorsville only Berry's division of Sickles's corps and a brigade of Couch's. With Berry's division he vainly tried to check the fugitives, some of whom were shot down by his staff. Berry's division then pressed straight through the flying crowd, and poured a fire of artillery up the road and into the woods. This brought the pursuers to a stand. Jackson, with a small escort, had ridden out to reconnoitre. Turn-

ing back, he was fired upon by his own men, who mistook the company for enemies. He received several wounds, from which he died a week later. Hill, the next in rank, was also wounded soon after, and the command devolved upon Stuart. In this action Hooker had suffered nothing beyond the partial disorganization of Howard's corps, the weakest in the army; the ground lost was of no consequence; and moreover Reynolds's large corps arrived during the night from Fredericksburg. —On Sunday morning, May 3, Hooker still stood on the defensive; he indeed ordered a new line to be drawn up, to which he might fall back in case of need. Lee had in the mean time communicated with Stuart, and given orders that "those people should be pressed." Hooker now had at and about Chancellorsville fully 78,000 effective men; Lee proposed to press him in his intrenchments with barely 50,000. The Union force was all together; the confederates were separated by six miles of almost pathless forest, and it depended upon the chances of battle whether these could be reunited. Moreover, Sedgwick, who had with him 27,000, might fairly be expected to be able to drive off the 10,000 of Early, and appear on the field, as he was now ordered to do. Then, could both commanders concentrate their whole force, Hooker would have 95,000, Lee at most 60,000. Hooker's line now formed three sides of an irregular square. The left, facing eastward, was held by Hancock's division of Couch's corps; the centre by Slocum; the right, facing westward, by Sickles and French's division of Couch's corps. Reynolds was halted two miles in the rear of the extreme right; Meade was partly in reserve, and partly guarding the road leading to the river; Howard was on the extreme left, where no attack was anticipated. These last three corps took no part in the action of the day. Sickles's extreme left had been at Hazle Grove, apparently pushed beyond the general line, and exposed to attack. Hooker directed him to withdraw from that position, which was immediately seized by Stuart, who planted there a battery of 30 guns. This was the most important point on the field, for the artillery there commanded Chancellorsville and completely enfiladed the whole Union centre. As the morning fog lifted, Stuart moved to attack Sickles; the attack was hotly made and fiercely repelled. At length Sickles's ammunition fell short, and he asked for support. His demand came at an unpropitious moment. Hooker had been leaning against a pillar at Chancellorsville; a half-spent shot from Hazle Grove struck this, and Hooker fell insensible from the concussion. There was no one to send support to Sickles, though the two corps of Reynolds and Meade, together outnumbering Stuart's whole force, were wholly disengaged. Half of either of these would have been enough to insure victory; for, Stuart's attack repelled, the remainder of Hooker's

disengaged force sweeping around would have enveloped the broken corps. They could not have carried off a gun, or got away except by creeping in squads through the forest. This seems to have been Hooker's plan; but if so, no attempt was made to carry it out. Sickles, having exhausted his ammunition, sent his now useless artillery to the rear, and fell back a little to a line which he would hold by the bayonet. To his surprise he was not at once followed, and looking to his front, the enemy seemed to be broken up and defeated. Just at this moment French, with a single division, had struck Stuart's left and forced it back for a space. This was the only offensive movement made on that day by any part of Hooker's force. Stuart then rallied his whole force, and in turn repelled French. All this time Lee, with the divisions of Anderson and McLaws, had assailed the Union centre, which Slocum was holding under the enfilading fire from the 30 guns at Hazle Grove, but always edging to the right to unite with Stuart. This junction was effected at 10 o'clock, when the battle there still hung in even scale. Both sides had suffered severely. Stuart, out of the 29,000 which he had in the morning, had lost 6,000 killed and wounded, and 1,500 prisoners; Sickles and French had lost 5,000 out of 22,000. The united confederate force, about 42,000 strong after its losses, converged toward Chancellorsville. In their way stood Sickles, French, and Slocum, with 10,000 less, while not two miles distant on either hand were Reynolds, Meade, and Howard, with 42,000, not a regiment of which moved at this extreme moment toward the scene of conflict. The stress of the combined attack fell upon Sickles. Five times the assault was repelled; then all at once the whole Union line melted away, Sickles's corps first yielding the position. Couch had by this time assumed some sort of command, and in obedience to his orders the whole army fell back to the position which had been marked out during the previous night. As a defensive position to be held against a superior force, it was an excellent one. It formed a sharp curve, the apex nearly a mile back of Chancellorsville, and the sides stretching to the river and covering the fords. Each flank was protected by a small stream, with densely wooded banks. The front could be approached only by a few rough roads. Lee was on the point of ordering an attack, when he received tidings that Sedgwick had carried the heights at Fredericksburg, and Early was unable to hold the new position which he had taken up. Lee sent four brigades which had suffered least, and a series of sharp conflicts ensued, neither side gaining any important advantage. Night coming on, both armies slept upon the field.—No army ever stood in greater peril than did that of the confederates on Monday morning. All counted, it numbered less than 50,000 effective men. Stuart and Anderson at Chancellorsville, with 30,000, confronted Hooker

with 70,000; six miles to the east was McLaws with 10,000; three miles southward was Early with 9,000. Sedgwick had lost heavily, but he still had as many as McLaws and Early together. It was hardly possible that Hooker would not discover the situation, and either attack Stuart with more than two-fold numbers, or, leaving enough to hold him in check, fall upon McLaws, who would thus be crushed between two superior forces. Lee's only hope lay in dislodging Sedgwick, so he still further weakened Stuart by detaching Anderson with 10,000 men to the support of McLaws and Early, who had now effected a junction. The whole force, 27,000 strong, was at noon directed against Sedgwick, who with 18,000 assumed a defensive position. There was some skirmishing during the afternoon, but no serious action took place till 6 o'clock, when Anderson forced Sedgwick's right, under Howe, back to a strong position near the Rappahannock. Hooker meanwhile had sent contradictory orders to Sedgwick. In the morning he was told to recross the Rappahannock, if he thought best; at 11 o'clock he was directed to remain where he was. During the night he was again told to cross; a few minutes later an order countermanding this was sent; but it was not received until the former one had been obeyed, and it was too late to return, for the enemy had taken a position which commanded the bridge. But during the night Hooker had made up his mind to abandon his own position, and threw up new intrenchments to cover the bridges. Lee moved toward these, apparently intending to assault. But on Tuesday afternoon a fierce storm arose. The river rose rapidly, submerging the approaches to the bridges; one of these was taken down to piece out the other, and over this the Union army retreated during the night without being perceived. An analysis of the official reports on both sides shows that the Union loss in this series of actions was about 17,000, of which there were 12,000 killed and wounded and 5,000 missing; that of the confederates about 13,000, of which 10,300 were killed and wounded, and 2,700 missing. Of the Union loss in killed and wounded, about 7,000 were in the two corps of Sickles and Sedgwick; 4,400 in those of Slocum, Couch, and Howard; and only 600 in those of Meade and Reynolds. Of the missing, 2,000 were from the corps of Howard, which numbered only 11,000. Of the confederate killed and wounded, 6,800 were in the three divisions under Stuart, which originally numbered 30,000. Hooker himself said that he had more men than he could use; that he "had fought no battle," because he could not get his men into position to do so; and that he had failed in the enterprise which had been so brilliantly begun from causes "of a character not to be foreseen or prevented by any human sagacity or resources."—The cavalry expedition under Stoneman was equally abortive. The main body went to within 30

m. N. W. of Richmond, where it was separated into six. One struck the James River canal, and made an ineffectual attempt to destroy the aqueduct across the Rivanna river; one rode to within two miles of Richmond, passing clear through the outer defences, and destroying a railroad station; four others tore up a few rails on the Fredericksburg railroad, which was the main purpose of the expedition, but doing so little injury that in three days the trains were again running. The scattered bodies at length made their way back, crossing the Rappahannock May 8.

CHANCERY. By this term is designated the English system of equity, which in a modified form has been introduced into the United States. The name, according to Coke, was derived *a cancellando*, because it was the office of the chancellor to cancel letters patent of the king which had been imprudently issued. Others, as Spelman and Cowell, suppose that it originated *a cancellis*, that is, lattice work, by which the crowd was shut off, an etymology which is supported by the analogous case of the title of the legal profession in England and this country, which is taken from the bar or railing by which practising lawyers were enclosed and separated from other attendants in court. The system which the name designates is as peculiar as its title. There are several theories as to the mode in which this branch of jurisprudence has been developed. One is that it was a usurpation by the chancellors, who were at an early period ecclesiastics, and hostile to the spirit of the common law. This was maintained by Sir Edward Coke, who while chief justice of the king's bench vigorously resisted the attempt of the lord chancellor Ellesmere to give relief against a judgment in the king's bench, which had been notoriously obtained by fraud. The parties and their solicitors and counsel were indicted for questioning the judgment; but the matter having been brought before the king, he decided in favor of the courts of equity, but putting his decision merely upon an arbitrary discretion, which he claimed as his prerogative. The jurisdiction of actions by the court of chancery took its rise from a device of ecclesiastical chancellors to evade the statutes of mortmain, that is to say, statutes prohibiting the grant of lands to religious houses. Instead of a grant of the lands directly to the parties thus disabled to take, the practice was introduced of making a grant to a person who was under no disability, but for the use of religious corporations or persons; and in chancery it was held that the use was binding in conscience, and could be enforced. It was for the purpose of getting jurisdiction of this class of cases that John Waltham, chancellor of Richard II., adopted the *subpena*, which has ever since been the process for commencing a suit in equity. To understand the nature of this innovation, it is necessary to bear in mind that all writs for the commencement of suits in the different courts,

though issued from the office of the chancellor, which was called *officina justitiæ*, were returnable not to the office from which issued, but to the courts where such suits were to be prosecuted. But the chancellor claimed to have authority from something contained in one of the statutes to compel parties to appear in chancery and answer in respect to a use. So far there is some color for the charge of usurpation of authority for ecclesiastical advantage; but when by act of parliament, passed shortly afterward, uses were made subject to the statutes of mortmain the same as the lands themselves, the doctrine of the court was found to be beneficial otherwise as a relief from restraints upon the alienation of property which had long existed. In the reigns of Henry IV. and V. the commons attempted unsuccessfully to suppress the writ of subpoena, the object of which was to take away the jurisdiction of the court of chancery; and in the reign of Edward IV. it had become the regular practice of the court to entertain actions commenced by that process. The statute of uses, 27 Henry VIII., by which uses were executed, that is to say, transferred into possession, seemed likely to oust the chancellor of his new jurisdiction, as the courts of common law thereupon took cognizance of a use as being the real ownership of land; but by a narrow construction of the law, by which only one use was recognized, the court of chancery was enabled to regain its power. Thus a conveyance to A, for the use of B, in trust for C, was held to be a use executed in B, and the trust for C remained and might be enforced in equity. Gradually the jurisdiction of the court was extended to a great variety of other cases, some of which were cognizable by common law courts. For the most part, however, its province was to give relief when the forms or rules of the common law could give none. Common instances of this were afforded in the case of penalties and forfeitures. At common law, the penalty of a bond was deemed the debt upon non-performance of the condition, and judgment was recovered accordingly; but in chancery the amount really due was considered to be the debt, and on tender thereof with costs of suit at any time before judgment a stay of proceedings was granted. So as to mortgage: at common law the land was forfeited upon non-payment of the debt when due; but in chancery relief was given upon subsequent payment or tender of the real debt. The same doctrine was extended to pledges, and to other personal contracts subject to a penalty or involving a forfeiture. In many of these cases the rules of law gradually conformed to equitable principles; as for instance, a judgment upon a bond, although nominally for the penalty, could be enforced only for the amount really due; and so mortgaged lands could not be retained after tender of the real debt, and this led to the process of filing a bill in chancery by the mortgagee in order to

acquire the absolute title. In general, however, all courts, chancery included, must give the same effect to positive laws, and must be subject to the same rules of interpretation, and there might be cases of extreme hardship in which equity could afford no relief whatever. In the exercise of its original jurisdiction chancery gave relief against fraud, accident, or mistake in contracts, and for this purpose might set aside written instruments, or reform them to make them conform to the real agreement of the parties; might take accounts in partnership or other mutual dealings which were too complex to be properly tried by jury; might compel the specific performance of contracts for the conveyance of lands, and in a very few other cases where the recovery of damages would be an inadequate remedy; might compel the execution of trusts, either express or implied, and exercise a general supervision over charities. The chancellor had also committed to him the general custody of infants, idiots, and lunatics, and appointed guardians of their persons and estates, to act under the direction of the court. One of the most important branches of its jurisdiction was the issuing of injunctions to stay proceedings in other courts where they were being taken against equity, to stay waste, to restrain infringements of patents or copyrights, to prevent nuisances, to enjoin the negotiation of bills, &c., where the party would be deprived of a remedy thereby, and generally to prevent irremediable injury. In many cases it aided the courts of law, by compelling parties to suits in them to make discovery of facts, by perpetuating testimony otherwise in danger of being lost, and sometimes by enjoining the setting up of an inequitable defence. Proceedings in equity have differed from those at law principally in three particulars: 1, in the proofs, the complainant being at liberty to compel the defendant to give evidence by his answer; 2, in the mode of trial, which formerly was by taking the written depositions of witnesses, upon which the judge passed without the aid of a jury; and 3, in the mode of relief, which at law was usually the award of damages, while in equity a specific execution of contracts might, as we have seen, in some cases be compelled, and in others damages might be anticipated and enjoined.—Equitable remedies have until recently been administered in England by the lord high chancellor, assisted by three vice chancellors and the master of the rolls, and also by two lords justices sitting with the chancellor as a court of appeal. Formerly the court of exchequer also had equitable jurisdiction. The court of chancery was formerly the subject of very serious complaints because of its delays and expenses, but these were obviated to a considerable extent by the abolition of the office of master in chancery, and by giving the court authority to order the testimony to be taken in open court, and in its discretion to summon a jury for the trial of disputed ques-

tions of fact. Even these, however, have not satisfied the demands of reform. For more than a quarter of a century a sentiment has been growing and strengthening in England that the distinctions between law and equity, in their principles as well as in their administration, were unnecessary, illogical, expensive, and vexatious; and this has culminated at last in the act of Aug. 5, 1873, matured and supported by the lord chancellor himself, which consolidates all the superior courts of England, including the court of chancery, into one supreme court of England, which is to be presided over by the lord chancellor, and, without distinguishing between law and equity, to administer justice on equitable principles. The old forms of pleading are abolished; the summons by which the suit is commenced is indorsed with a statement of the nature of the claim made or the relief or remedy sought, the defendant files a statement of his defence, and the plaintiff replies if a reply is needful. Causes will be tried before one or more of the judges, sitting with or without assessors or a jury, or may be sent to a referee for hearing. (See COURT.)—In the jurisprudence of nearly all the United States equity law is administered by the same judges who sit in law cases, but under the forms prevailing in England before the recent changes. Some of the individual states have never had any distinct equity system, but in these equitable remedies have to some extent been administered under legal forms. In others there has been a separate court of equity; in others still equity law has been administered by the law judges as under the federal system. New York led off in 1848 with a code which abolished all the forms of action, and substituted a simple statement of the party's case in a complaint for the former declaration at law and bill in equity; thereby seeking to abolish the distinction between law and equity. Several other states have followed this example.

CHANDERNAGORE, a French colony in India, on the Hoogly, 17 m. N. of Calcutta; pop. about 29,000, of whom a few hundred are Europeans and the rest Hindoos. The settlement includes, besides the town, an island in the river and several villages, with an aggregate population of about 40,000. The quays of the town are fine, and the streets are in good condition; yet it presents a dilapidated appearance, though there are vestiges of former splendor and many Hindoo temples. The main occupation of the inhabitants is raising cattle. The principal export is opium.—This settlement was ceded in 1688 to the French East India company, and flourished under Dupleix. The English captured the town in 1757, and dismantled the fortifications. Restored to France in 1763, it again became an English possession in 1793. In 1816 it was returned to France, but has lost almost all its former importance.

CHANDLER, Richard, an English archæologist, born at Elson, Hampshire, in 1738, died at

Tilehurst, Berkshire, Feb. 9, 1810. He studied at Winchester and Oxford, held various livings in Hants, travelled extensively in Asia Minor, Greece, and other countries, and in 1800 was appointed rector at Tilehurst, where he spent the rest of his life. His works include a celebrated edition, undertaken under the auspices of the Oxford university, of the *Marmora Oxoniensia* (1763); "The Ionian Antiquities, or Ruins of Magnificent and Famous Buildings in Ionia," published jointly with the artists Revett and Pars, his fellow travellers, as the result of their explorations under the auspices of the dilettanti society (2 vols. fol., London, 1769-1800); and *Inscriptiones Antiquæ, &c.* (Oxford, 1774). He left a life of William Waynflete, bishop of Winchester, and founder of Magdalen college, which was published in 1811. His most remarkable productions are his "Travels in Asia Minor" (Oxford, 1775), and in Greece (1776), which proved very useful to Barthélemy in the preparation of his *Anacharsis*. Servois and Barbié du Bocage corrected some of the errors of these works in their French translation (3 vols., Riom, 1806). A new English edition, with notes by Revett, was published by the Rev. R. Churton, with a biography of the author (2 vols. 8vo, 1835). Chandler also prepared, in vindication of Homer's descriptions, a "History of Ilium, or Troy," as a continuation of these works (first part, London, 1802).

CHANDLER, Samuel, an English theologian, born at Hungerford, Berkshire, in 1693, died in London, May 8, 1766. He was the son of a non-conformist clergyman, and had for fellow pupils Joseph Butler, author of the "Analogy," and Thomas Secker, afterward archbishop of Canterbury. He completed his studies in Leyden, and became Presbyterian minister at Peckham. The South sea bubble of 1720 swallowing up his wife's fortune, he embarked in the book trade in London, while continuing to preach, and was selected with Dr. Lardner as an evening lecturer to a dissenting congregation in the Old Jewry, of which he was chosen pastor in 1726, and remained so till his death, 40 years after. He received the degree of D. D. from the universities of Edinburgh and Glasgow, and was a member of the royal and antiquarian societies. In 1760 he delivered a sermon on the death of George II., in which that monarch was likened to David; whereupon a pamphlet appeared, embodying Bayle's disparaging estimate of the Hebrew king. Chandler replied to the pamphlet, and was thus led to write his "Critical History of David" (2 vols., London, 1766), which is his most elaborate work. He wrote "A Vindication of the Christian Religion" (1725), "A History of Persecution" (1736), and several volumes of commentaries on different books of the Bible. A collection of his sermons was published after his death (4 vols. 8vo, 1768).

CHANDLER, Thomas Bradbury, D. D., an American clergyman, born at Woodstock, Conn.,

April 26, 1726, died at Elizabethtown, N. J., June 17, 1790. He graduated at Yale college in 1745, in 1747 was appointed catechist and lay reader in St. John's church, Elizabethtown, N. J., and in 1751 went to England for the purpose of receiving episcopal ordination. Upon his return he was made rector of St. John's church, and in 1766 received the degree of D. D. from the university of Oxford. In the discussions which preceded the war of the revolution, he rendered himself unpopular by advocating the claims of the British government. Partly on this account, and partly to obtain medical advice, he went to England in 1775, where he remained 10 years, occupying himself in study and writing, and receiving a salary of £50 from the society for the propagation of the gospel, and an annuity of £200 from the British government, which after his death conferred a pension upon his widow. On the conclusion of peace in 1783, his congregation requested him to resume his position as their rector. He returned to Elizabethtown in 1785, but in exceedingly ill health. A cancerous affection had developed itself upon his face, which greatly disfigured him, and in consequence he declined the bishopric of Nova Scotia, which had been offered him while in England. After his return to America he never attempted to perform any public service, but occasionally walked out with his face covered by a handkerchief. The vestry did not think proper, however, to appoint another rector, and in compliance with their request he consented to retain the station during his life. He was a zealous defender of Episcopacy, and in 1767 published "An Appeal to the Public in behalf of the Church of England in America." This work was attacked simultaneously from various quarters. Dr. Chauncy of Boston published an answer in behalf of the non-Episcopal churches. To this Chandler replied in 1769; Chauncy rejoined, and in 1771 Chandler responded in a third pamphlet.

CHANDLER, Zachariah. See supplement.

CHANDOS, Sir John, an English soldier, born at Radborne early in the 14th century, fell in battle at Lussac, Poitou, in 1369. He was the elder son of Sir Edward Chandos, and one of the original knights of the garter. He distinguished himself at Crécy and Poitiers, and received from Edward III., besides other favors, a barony and the title of vice chamberlain. The victory at Auray in 1364, in favor of the earl of Montfort, son-in-law of Edward III., as duke of Brittany, against Charles de Blois, was chiefly due to his valor. He procured the liberation of his antagonist Bertrand du Guesclin, won renown on various other occasions, and became constable of Aquitaine and seneschal of Poitou. The king of France exclaimed on his death that Chandos was the only warrior who could have made peace between him and Edward. He was buried at Mortemer, near Neufchâtel. Froissart and other historians praise his virtues and heroism.

CHANGARNIER, Nicolas Anne Théodule, a French general, born at Autun, April 26, 1793, died Feb. 14, 1877. He was educated at the military school of St. Cyr, served in the campaign of 1823 in Spain, and entered the royal guards. After the revolution of 1830 he went to Africa, where he soon distinguished himself, and became brigadier general in 1840, and general of division in 1843. In 1847 the duke d'Aumale, being governor general of Algeria, caused Changarnier to be put in command of the district of Algiers, and on the revolution of February resigned the governorship into his hands. Gen. Cavaignac having been appointed to this office by the republican government, Changarnier repaired to Paris, and was appointed ambassador to Berlin, but did not leave Paris, his services being required there to protect the national assembly. When Cavaignac became minister of war, Changarnier was appointed his successor as governor general of Algeria, which post he held for five months. Having been elected to the national assembly, he returned to Paris, and was invested with the command of the national guards. When Louis Napoleon became president, Changarnier was appointed commander of the regular troops, known as the army of Paris. He prevented outbreaks on Jan. 29 and June 13, 1849, and supported Louis Napoleon for a considerable time, exciting the distrust of the republicans. But he afterward strenuously opposed the president's measures, and lost his command on Jan. 9, 1851. The project of the assembly to place him in command of a force for its special protection against arbitrary proceedings having fallen to the ground, Changarnier, after declaring that Louis Napoleon would not find even one single soldier to assist him in a *coup d'état*, was powerless to prevent that event, and was arrested Dec. 2, 1851, and detained at Mazas for about a month, when he was banished from France, and took up his residence at Mechlin, Belgium. In 1859 he availed himself of the general amnesty to return to France. On the outbreak of the Franco-German war, Marshal Leboeuf, the minister of war, declined to avail himself of his services; but in August the emperor invited him to come to Metz, where he remained with Bazaine, who employed him in initiatory negotiations with Prince Frederick Charles, which resulted on Oct. 27 in the capitulation of the French army. Changarnier was a prisoner of war in Germany until the conclusion of the armistice in January, 1871, after which he returned to Paris. He was elected to the national assembly by the departments of Gironde, Le Nord, and Somme, and in 1875 was chosen a senator for life.

CHANG-CHOO-FOO, a city of China, in the province of Fokien, on the river Chang, 30 m. W. of Amoy; lat. 24° 35' N., lon. 117° 50' E.; pop. estimated at nearly 1,000,000. It lies in a picturesque valley, and is surrounded by a wall about 4½ m. in circumference, in which are four principal gates at the N., E.,

S., and W., not only forming means of access for roads into the city, but also admitting canals. The houses are very well built, but the streets are narrow, their width seldom exceeding 12 ft. A remarkable bridge crosses the river opposite the town; it is built on irregularly piled stone piers, of which there are about 30, nearly 30 ft. apart. The roadway, about 20 ft. above the water, is made of large stone blocks resting upon wooden beams. Chang-choo-foo is the centre of the silk manufacture of the province, and its trade both with the interior and with foreign ports is very active. Large tile and sugar factories give commercial importance to the suburbs.

CHANG-CHOW, or **Chang-choo**, a city of China, in the province of Kiang-soo, on the E. bank of the imperial canal, about 100 m. N. W. of Shanghai; lat. 31° 55' N., lon. 119° 43' E. It is surrounded by a wall 25 ft. high, and is otherwise well fortified. Several small canals connect it with the Tai-ho or great lake, and its commerce was formerly very extensive. Chang-chow is chiefly celebrated for the events of which it was the scene during the last decade of the Taiping rebellion. From 1860 to 1864 the place formed one of the chief strongholds of the rebels, resisting successfully all the attacks made upon it by the imperial troops. In the spring of the latter year the English Major Gordon, commanding 70,000 Chinese instructed in foreign tactics, laid siege to it; and on May 11 the city was carried by assault, after a conflict which ended in a massacre. Several thousand Cantonese troops, forming part of the garrison, were slaughtered after the capture; but about 20,000 natives of the province of Kiang-su, who had been pressed into the rebel service, were spared.

CHANNEL ISLANDS, a group of islands belonging to Great Britain, in the English channel, between lat. 49° and 49° 50' N., and lon. 2° and 2° 45' W., off the N. W. coast of France, between Normandy and Brittany; shortest distance from the French coast, 15 m., and from the English coast at Southampton, 115 m.; area, about 75 sq. m.; pop. in 1871, 90,563. The islands are: Jersey, pop. 56,627; Guernsey, with the islets Herm and Jethou, 30,667; Alderney, 2,718; and Sark, 551. The picturesque situation, the moderate cost of living, the mild climate, and the lightness of the taxes render these islands a favorite resort, and they are easily accessible by steamers from Southampton and Weymouth. The vernacular is the old Norman French, but the modern French is now used in the law courts. English is spoken in the towns. The soil is fertile, but owing to the minute subdivision of the land, agriculture is in a rather backward state. Horticulture and floriculture are flourishing. The principal manure is seaweed, which is also largely used for the production of kelp and iodine. The breed of cattle known as Alderneys are noted for their small size, symmetry, and excellence as milkers. Cattle raising, the

dairy, and fishing are the principal occupations of the inhabitants. The exports to the United Kingdom, comprising cider, wine, apples, and potatoes, amounted in 1870 to £457,389; and the imports, mainly manufactures, wheat, flour, sugar, and coffee, to £916,188. Near Ortach passage, about 6 m. W. of Alderney, are the Caskets, a dangerous cluster of rocks, where Prince William, only son of Henry I., perished in 1120; and the Victory with 1,100 men was lost here in 1744. Many lighthouses have been built off the islands within a few years.—These islands were known to the Romans, and are the only portions of the former duchy of Normandy now belonging to Great Britain, to which they have been attached since the conquest. They still retain a certain independent status, the government being administered by states, the members of which are partly named by the crown, partly chosen by the people, while others sit *ex officio*. Each of the principal islands has a military lieutenant governor, who sits in the states as representative of the crown. The high sheriff is variously called the *vicomte* and the *prévôt*. The royal court in each island consists of the bailiff or judge and the jurats or magistrates. There is no trial by jury, but an appeal may be made to the sovereign in council. The fortifications of the islands cost £500,000 annually, while the revenue is only about £20,000.

CHANNING, Edward Tyrel, LL. D., an American scholar, born at Newport, R. I., Dec. 12, 1790, died at Cambridge, Mass., Feb. 8, 1856. He entered Harvard college in 1804, but left in his junior year in consequence of a dispute between the students and the faculty, and did not receive his degree until some years later. He studied law in Boston with his elder brother, Francis Dana Channing, and was admitted to the bar, but devoted himself to literature. In 1817-'19 he was editor of "The North American Review," and afterward Boylston professor of rhetoric and oratory in Harvard college till 1851. He was a frequent contributor to the "Review" almost to the time of his death, and did much to elevate the standard of culture in his collegiate department. In 1856 a volume containing 20 of his lectures was published, with a memoir by Richard H. Dana, jr.

CHANNING, Walter, an American physician, brother of the preceding, born at Newport, R. I., April 15, 1786. He entered Harvard college in 1804, but left in his junior year on account of the college dispute of 1807. He studied medicine in Boston and Philadelphia, received the degree of M. D. from the university of Pennsylvania, afterward studied at the university of Edinburgh, and at Guy's and St. Thomas's hospitals in London, and began practice in Boston in 1812. The same year he was appointed lecturer, and in 1815 professor, of obstetrics and medical jurisprudence in Harvard university, which office he filled until his resignation in 1854. In 1821 he became as-

sistant of Dr. James Jackson as physician of the newly established Massachusetts general hospital, and labored there for nearly 20 years. He has been a frequent contributor to medical and literary periodicals, besides publishing "Etherization in Childbirth," illustrated by 581 cases (Boston, 1848); a volume of "Miscellaneous Poems" (1851); and "A Physician's Vacation, or a Summer in Europe" (1856). The treatise on "Etherization in Childbirth" attracted great attention both in Europe and America, and had a marked effect on the state of that branch of science. Subsequently he published "Professional Reminiscences of Foreign Travel," "New and Old," and "Reformation of Medical Science" (1857).

CHANNING, William Ellery, D. D., an American clergyman and author, brother of the preceding, born at Newport, R. I., April 7, 1780, died at Bennington, Vt., Oct. 2, 1842. His physical organization was at once delicate and vigorous; his appearance was grave and reflective; his mind was early occupied by religious and poetic conceptions, and he sometimes startled his associates by the vehemence with which he would repress any injustice that was attempted. The lessons of his mother had developed his religious sensibility, and the doctrinal conversations then in vogue had turned his attention to theology, when at the age of 12 he was sent to New London, Conn., to prepare for college. His father soon afterward died, and to the impression of the funeral and the influence of a revival which then swept over New England he attributed the commencement of his decidedly religious life. Esteemed by his friends for diligence and scholarship, for fine powers and pure habits, he entered the freshman class of Harvard college in 1794. In no single study superior to all of his classmates, he surpassed them all in versatility of talent and the wide range of his accomplishments, and especially in his power of written composition. As his character matured, he devoted himself more and more intently to aspirations after moral greatness. He studied the Stoics, and was profoundly moved by the stern purity which they taught. In reading Hutcheson's essays on "Beauty and Virtue," in which virtue is defined as self-devotion to the absolute good, and the universe described as a system of progressive order and beauty in which there are infinite possibilities of spiritual destiny, he attained that sublime view of the dignity of human nature which he ever after maintained. The work of Ferguson on "Civil Society" also concentrated his energies on the thought of social progress. The study of Shakespeare gave him a powerful intellectual impulse, and through life one of his chief intellectual pleasures was furnished by recitations from his plays. The interest which he took in prevalent social agitations appears from the subject of the oration, "The Present Age," which he delivered at the graduation of his class. Having selected the profession of divinity, he spent

18 months after leaving college as tutor in a private family at Richmond, Va., where his time was passed in agreeable social relations and in study, chiefly of political and theological subjects. His health suffered severely from his anxious examination of speculative doctrines, and in 1800 he returned to Newport to continue his studies. There he used to alternate between the public library and the seashore, on which he afterward affirmed that he had passed his hardest spiritual struggles. In 1801 he removed to Cambridge, having been elected regent in the university, and devoted himself to theological study and spiritual discipline. He was intimately connected with Dr. Samuel Hopkins, the disciple of Jonathan Edwards, whom he warmly esteemed; and when in 1802 he received from the Cambridge association the usual approbation to preach, it was supposed by many of the ministers that he would enlist on the side of extreme orthodoxy. Yet, as he subsequently stated, he was at this time an Arian, though tinged with ethical opinions derived from Dr. Hopkins. His preaching at once attracted attention for its fervor and solemnity, and both the Brattle street and Federal street societies in Boston sought to obtain him for their pastor. Diffident both of his health and abilities, he chose to settle over the smaller society in Federal street, and was ordained June 1, 1803. His congregation increased with his reputation for eloquence and devotion, till in 1809 the old church was taken down to give place to one larger. His whole spiritual energy became concentrated in his labors as pastor, in sermons so exhausting that he was nearly prostrated at their close, in attending prayer meetings and Sunday schools, and in ministering to the sick and mourning. By the custom of exchanging with other clergymen he became widely known throughout New England, and it was said of him and his friend, the younger Buckminster, that they had introduced a new era in preaching. When the disagreement in doctrine between the "liberal" and the "orthodox" Congregationalists burst forth into the Unitarian controversy, Dr. Channing was the acknowledged head of the liberal party, and took an active part in its defence. Opposed to the Calvinistic scheme and the doctrine of the Trinity, he was even more at variance with the views of Priestley and Belsham. He blended in his system views which have generally been deemed discordant; and without checking himself by dialectic difficulties, he threw over his complex theology the charms of imagination and sentiment, and linked it with schemes of moral and social reform. During the period of most vehement debate his pure and earnest character won the constant admiration of his opponents. In 1814 he married, and soon after obtained some acquaintance with the master minds of Germany. From Kant's doctrine of the reason he derived deeper reverence for the essential powers of man; by Schelling's intimations of the divine

life everywhere manifested, he was made more devoutly conscious of the universal agency of God; and he was especially delighted with the heroic stoicism of Fichte and his assertion of the grandeur of the human will. But for his greatest pleasure and best discipline he was now indebted to Wordsworth, whom he esteemed next to Shakespeare. From this time he began to engage more actively in political and philanthropic movements. He delivered, June 15, 1814, a discourse on the overthrow of Napoleon and the "goodness of God in delivering the Christian world from military despotism." He early gave his sympathy and support to the peace movement in this country; and in 1816 he preached a discourse on war before the convention of the Congregational ministers of Massachusetts, which was printed and widely circulated, and prepared the way for the formation of peace societies in several of the states. Temperance, reform in penitentiary discipline and punishments, missions, and Bible distribution all received his encouragement. His church was always thronged when he preached, and by various public discourses, among which were sermons occasioned by political crises, a sermon on the Unitarian controversy delivered at Baltimore in 1819, and his Dudenian lecture on the "Evidences of Christianity," delivered at Cambridge in 1821, his celebrity was extended throughout the country. In 1822 he made a European tour, saw Wordsworth and Coleridge in England, the latter of whom wrote of him, "He has the love of wisdom and the wisdom of love," and visited France, Switzerland, and Italy. On his return he resumed his pastoral labors with more than his former energy, till in 1824 he received as colleague the Rev. Ezra Stiles Gannett; and from this time his efforts were more in the general field of literature and reform. His remarks on the character and writings of Milton, his two articles on the life and character of Bonaparte, and an article on Fénelon, published between 1826 and 1829, attained a very wide celebrity, and brought him into correspondence with several of the most eminent literary persons in England and America. His writings are most characteristic and effective when treating questions of Christian philanthropy and social reform. In behalf of peace, temperance, education, and freedom, he repeatedly came before the public, and he examined with sympathizing respect and anxious scrutiny every movement which promised more happy social relations. Without accepting absolutely the doctrine of non-resistance, he remonstrated against war, reviewing its crimes and miseries, in 1835, when there was danger of a rupture with France, and in 1839, when there was a prospect of conflict with Great Britain. The wide scope which he gave to education is seen in some of the most valuable of his lectures, especially that on "Self-Culture," delivered in 1839, and the series on the "Elevation of the Laboring Classes," in 1840. His attention was specially turned to the subject

of slavery by a winter's residence on the island of Santa Cruz in 1830. His first efforts were to arouse the moral feeling against slavery, and it was not till 1837 that he deemed special political action needful. In that year, by addressing a public meeting in Faneuil Hall, he became closely identified before the public with the abolition movement, into which he sought to infuse his own spirit of calmness and candor. His work on "Slavery," published in 1841, had a wide circulation, and the last public act of his life was to deliver an address at Lenox, Mass., Aug. 1, 1842, on the anniversary of the emancipation in the West Indies. During the latter years of his life he resided in winter in Boston and in summer in Newport, and his death was caused by an attack of typhus fever while pursuing a mountain excursion. Dr. Channing belonged to the poetic order of philosophic minds. His words as well as his opinions were usually chosen from among those which express the sunny, hopeful, and possible view of things. He was buried at Mount Auburn, where a monument designed by his friend Washington Allston was dedicated to his memory.—The most complete edition of his works was published in Boston in 1848, in 6 vols. 12mo, and between 1870 and 1872 200,000 copies were issued by the American Unitarian association. In England a selection of his works appeared in 1849 under the title, "Beauties of Channing." Many of his essays have been translated into German at various times, and a more complete selection from his works was translated by Sydow and Schulze (15 vols., Berlin, 1850-'53). His nephew, the Rev. William Henry Channing, prepared "Memoirs of William Ellery Channing, with Extracts from his Correspondence and Manuscripts" (3 vols., Boston, 1848). Édouard Laboulaye published *Œuvres sociales de W. E. Channing, précédées d'un essai sur sa vie et ses doctrines* (Paris, 1854); and the translations, *De l'esclavage* (1855), and *Traité religieux*, also preceded by introductions (1857), were favorably reviewed in the leading French periodicals. In 1857 appeared, from the pen of an English lady, a French work founded upon the "Memoirs" by the Rev. W. H. Channing, and entitled *Channing, sa vie et ses œuvres*, with a preface by M. Charles de Rémusat, of which an enlarged edition was published in 1861. "The Perfect Life, in Twelve Discourses," edited from Channing's MS. by his nephew and biographer, was published in 1873. The French academy of moral and political sciences offered a prize for the best essay or *étude* on Channing, for which in 1873 there were three competitors.

CHANNING, William Ellery, an American author, son of Dr. Walter Channing, born in Boston, June 10, 1818. He was sent in his 8th year to the Round Hill school at Northampton, and afterward to the Boston Latin school, where Charles Sumner was one of his instructors. On leaving the Latin school he entered Harvard college, but did not remain there suf-

ficiently long to graduate. In 1839 he removed to Illinois, and lived for a year and a half in a log hut built by himself on a prairie. In 1840 he went to Cincinnati, and was for a short time connected with the "Gazette." In 1842 he returned to Massachusetts, and having soon after married a sister of Margaret Fuller, established his home in Concord, where with short intervals of absence he has since continued to reside. In 1844-'5 he was employed on the editorial staff of the New York "Tribune." In 1846 he made a brief visit to Europe. In 1855-'6 he was one of the editors of the New Bedford "Mercury," and lived for a while in that city. Mr. Channing began at the age of 18 to contribute verses to the Boston "Journal," in which he also published a series of essays on Shakespeare. He wrote much in prose and verse for the "Dial" (1841-'4), including an unfinished romance entitled "The Youth of the Poet and Painter." In 1843 he published a volume of poems; a second volume in 1847; a third, "The Woodman," in 1849; and two other volumes of verse, "Near Home" (1858), and "The Wanderer" (1872). He has also published two prose volumes, "Conversations in Rome" (1847), and "Thoreau, the Poet-Naturalist" (1873).

CHANNING, William Henry, an American clergyman, cousin of the preceding, born in Boston, May 25, 1810. His father, Francis Dana Channing, died when he was very young. His early education was received at an academy in Lancaster, Mass., and at the Boston Latin school. He graduated at Harvard college in 1829, and at the Cambridge divinity school in 1833, and was ordained at Cincinnati in 1835. He has been pastor of several religious societies in America, and in 1857 succeeded James Martineau as minister of the Hope street Unitarian chapel, Liverpool, England. He returned home soon after the beginning of the civil war, and was settled for a time as pastor of the Unitarian church in Washington. For many years he took a conspicuous part in the socialistic movement, editing "The Present" and "The Harbinger," and in 1848 was president of the Boston union of associationists. He has been connected with the press as editor of several journals, and as contributor to the "North American Review," the "Dial," and the "Christian Examiner." He has translated Jouffroy's "Ethics" (2 vols., Boston, 1840), and written the "Memoir of William Ellery Channing" (3 vols., Boston, 1848), "Memoirs of the Rev. James H. Perkins" (2 vols., 1851), the "Memoirs of Margaret Fuller Ossoli" (in conjunction with R. W. Emerson and J. F. Clarke, 2 vols., 1852), and a work on "The Christian Church and Social Reform." In 1869-'70 he delivered a course of lectures before the Lowell institute, Boston. In 1872 he published in London "The Perfect Life," a posthumous volume of Dr. Channing's sermons, for which he wrote a preface. At present he lives in England.

CHANT (It. *canto fermo*; Fr. *plein chant*), a modification of song, between air and recitative, such as is adapted to the psalms and litanies. This species of music is very ancient. St. Paul exhorts the early Christians to chant psalms and canticles. Pliny the Younger mentions that the Christians assembled at break of day to chant their hymns. The chant grew with the progress of Christianity. Pope Sylvester about 330 founded a school for its culture; and St. Ambrose arranged from the old Greek music a new description of chant, the Ambrosian, which remained in use until superseded by the chant arranged by Pope Gregory the Great, hence called the Gregorian or Roman chant, and which, somewhat modified, is in use at the present day. (See **AMBROSIAN CHANT**, and **GREGORIAN CHANT**.) Chants are properly of three kinds: the monody, sung by one voice; the antiphony, alternately by two; and the choral, by all voices.

CHANTAL, *Jeanne Françoise Frémiot*, baroness de, a saint of the Roman Catholic church, born at Dijon in 1572, died at Moulins in 1641. She was the daughter of a president of the Dijon parliament, and early married Christophe de Rabutin-Chantal. Her husband was killed while hunting, and although she was only 28 years of age, she took a vow never to marry again. From this time her sole occupation and recreation was the education of her children and the care of the sick and the poor. She became acquainted with St. Francis de Sales in 1604, and placed herself entirely under his direction. He communicated to her his project for the establishment of the order of the Visitation, and she so far entered into his views that in 1610 she laid the first foundation of that order at Annecy. She established her children in life (one of whom became the father of Mme. de Sévigné), and then devoted the remainder of her days to the order, being designated as the *mère de Chantal*. At her death the order comprised 87 houses; at the close of the 17th century they numbered 150, and about 6,600 members. Her beatification took place in 1751, and she was canonized by Clement XII. in 1767. Her life and letters were published in Paris, 1779.

CHANTIBUN, or *Chan-ta-bon*, a town of Siamese Cambodia, on a small river 5 m. E. of the gulf of Siam, 140 m. S. E. of Bangkok; pop. about 30,000, chiefly Chinese. It lies at the foot of a chain of mountains. The exports include pepper, rice, gamboge, cardamoms, and dye-woods, which are shipped on small boats to Bangkok and thence sent to foreign countries.

CHANTILLY, a town of France, in the department of Oise, 24 m. N. by E. of Paris; pop. about 3,500. It abounds in natural beauties. A forest extending over nearly 7,000 acres adjoins the fine public park and pleasure grounds. Three annual horse races are held here, the spring race being the most important. The *grand château*, in which the great Condé gave splendid entertainments, was destroyed in 1793,

and only the renowned stables and the *petit château* remain. The latter, one of the most admired renaissance structures in France, reverted after the death of the last of the Condés



Dome of Stables, Chantilly.

in 1830 to the duke d'Aumale, to whom it was restored in 1872, after having been confiscated by Louis Napoleon. The town contains an English chapel. There are several large establishments for supplying lacemakers in the vicinity with patterns and materials for a peculiar kind of lace known as Chantilly.

CHANTREY, *Sir Francis*, an English sculptor, born at Norton, Derbyshire, April 7, 1781, died in London, Nov. 25, 1841. Although designed for the law, his taste led him to be apprenticed to a wood carver; and later, wishing to be more wholly an artist, he undertook modelling in clay, first in Dublin, then in Edinburgh, and lastly in London. A bust sent in 1806 to the exhibition of the royal academy interested Nollekens, a popular sculptor, through whom Chantrey was brought into notice, and soon became famous. He was made a member of the royal academy in 1818, and in 1819 of the academies of Rome and Florence, and was knighted in 1835; and as a popular sculptor of monumental figures he acquired a large fortune. His ideal works are few and unimportant, and some of the best of them are from the designs of others; he suffered moreover from disease of the heart, so that many of his works had to be finished by his assistant, Mr. Weekes; yet he gained the foremost place in this order of sculpture, and his numerous busts form a complete gallery of the most distinguished men of his time. His monumental works are the most important; the best of them being the "Sleeping Children," in Lichfield cathedral, after designs by Stothard. He enriched Westminster abbey with many sculptures, among which the fine statue of Canning is considered his masterpiece. One of his best works is the bronze statue of Pitt, in Hanover

square, London. He also made the statues of Washington, in the state house, Boston; James Watt, in the church of Aston, near Birmingham; and Bishop Heber, at Calcutta. He constructed a funeral vault for himself in the church of Norton, where he was buried; and left certain bequests to the clergyman and the poor of the place upon condition of the tomb being kept in order. He died without children or near relatives, and left his fortune, after suitable provision for his widow, for the encouragement of art. The original models of most of his works, comprising valuable portraits of his contemporaries, were presented by Lady Chantrey to Oxford university.—See his life by George Jones (London, 1850), and by John Holland (1851).

CHANZY, Antoine Eugène Alfred, a French soldier, born at Nouart, Ardennes, March 18, 1823. He enlisted in his 16th year as a cabin boy on a man-of-war. The next year he returned to school, and subsequently studied at the military academy of St. Cyr. He served in Algeria under Canrobert, and in 1859 distinguished himself in the battle of Solferino, Italy, where he became lieutenant colonel. He rejoined the service in Algeria, and in 1868 attained the rank of brigadier general. In the Franco-German war he was general of division of the 16th corps in the army of the Loire, under Aurelle de Paladines. He proposed to prevent the junction of the German armies, defeat them in detail, and march on Paris; but his plan was not adopted. During the protracted struggle before Orleans, he attacked the Germans on Dec. 1, 1870, and gained some indecisive successes in the vicinity of Patay; but the next day he was assailed by the grand duke of Mecklenburg and Gen. Von der Tann, lost ground after a bloody engagement, and was obliged to retreat on Dec. 3. The disastrous defeat of the army of the Loire was chiefly ascribed to the isolation of the 18th and 20th corps, and to Prince Frederick Charles's availing himself, by a decisive stroke, of their immobility, to mass his troops against the French centre. Chanzy was now appointed commander-in-chief of the so-called second army of the Loire, thus dividing with Bourbaki, appointed to the head of the first army, the former command of Aurelle de Paladines. He made a vigorous stand at Meung and Beaugency, in order to cover Tours; but was soon forced to abandon the line of the Loire, and after various desperate conflicts between that river and the Sarthe, he was overwhelmingly defeated before Le Mans, Jan. 12, 1871, and told the government that it was impossible to continue the war. The projects of Chanzy were regarded as brilliant and skilful, but both he and Aurelle de Paladines were obliged to follow the instructions of the political authorities. Chanzy became a member of the national assembly at Bordeaux and Versailles, and published in 1871 *La deuxième armée de la Loire* (4th ed., April,

1872), in vindication of his generalship and of the bravery of his troops. In September, 1872, he was appointed commander of the 7th army corps at Tours, and in 1873, under President MacMahon, governor general of Algeria.

CHAOS (Gr. *χάος*, from *χαλεῖν*, to gape, to open widely), in classical mythology, either the empty and infinite space which existed before all things or the mixture of all the elements, the confused mass out of which the ordered creation was formed. By the poets Chaos was personified and made the most ancient of the gods, the father of Erebus and Night. The principle of the fecundity of chaos assumed several modifications in the Greek systems of philosophy. Something similar to the Greek conception of chaos is found in the Phœnician, Chaldean, and Indian cosmogonies; and Ovid's description of the genesis of the universe out of chaos has so many features in common with the Mosaic account of creation, that it has often been supposed to have been derived from it.—In natural history, *chaos* is the name given by Linnaeus to animals and plants of the lowest orders, which have imperfect parts.

CHAPALA, a lake in the state of Jalisco, Mexico, bordering upon Guanajuato on the north and Michoacan on the east and southeast. It lies between lat. 20° 15' and 20° 45' N., and lon. 101° 50' and 103° 17' W., and has an area of about 1,200 sq. m., being thus the largest lake in the republic. Its depth during the floods—July and August—is 6½ fathoms, gradually diminishing in the dry season to about 5 fathoms. Its surface is interspersed with beautiful islands. The lake communicates with the Rio Grande de Santiago, to the waters of which river it is supposed to owe its formation. It abounds in excellent fish, affording a profitable occupation to numbers of the inhabitants of the adjacent country.

CHAPEL, a term originally applied to private oratories, derived from the practice of the ancient kings of France of carrying along with them on the battle field St. Martin's hat as a relic, the place in which it was kept being called *capella*, and the priest in charge of it *capellarius*. The famous *sainte chapelle du palais* in Paris was built by St. Louis, and consisted of an upper and lower chapel, which latter is in course of restoration. It suffered much during the revolution, and its relics are in Notre Dame. In the latter cathedral is the celebrated *chapelle du damné*, deriving its name from the legend that Raymond Diocres, a friend of St. Bruno, returned to life during his funeral, and exclaimed that he was damned, which led to the saint's retirement to a cloister, and furnished the theme for Lesueur's celebrated painting. In the church of St. Victor at Marseilles there was a subterranean chapel, which women durst not enter because, according to a legend, a queen was punished with the loss of her sight for having entered it; and there are a number of chapels in Rome inaccessible

to women except at the risk of excommunication. The music of the chapels of Louis XIV. and other French sovereigns was remarkable for its beauty, and the term chapelmaster is hence often applied on the continent to leaders of orchestras. *Chapelles ardentes* were laid out with great splendor for the celebration of the funerals of French sovereigns, and date from the earliest Christian ages. One of the most magnificent of the kind was that built for receiving the ashes of Napoleon I. when they were brought in 1840 to Paris from St. Helena. There are at this day five categories of chapels in France: *simples* or *communales*, *vicariats de secours*, *domestiques*, and those inside of churches. In Rome, besides the renowned Sistine chapel, there is that of San Andrea della Valle, which is said to have been built on the spot of St. Sebastian's martyrdom. The chapel dedicated to St. Clement is associated with a legend that it was built by angels, and suddenly appeared on the spot, from which the sea had just retreated, upon the drowning of the saint by order of Trajan. In England, at the present day, dissenting places of worship are generally called chapels, and there are parochial chapels distinct from the parish church; while on the continent of Europe Anglican churches, being generally small, are designated as chapels. Chapels of ease exist in large English parishes for the accommodation of neighboring worshippers; and there are private chapels in many residences of noble families in England, as well as at many foreign legations in various countries. In Roman Catholic churches chapels are often set aside and dedicated to services in honor of particular saints. The knights of the chapel, or poor knights of Windsor, were designated in the will of Henry VIII. for attending royal funerals. Their number has been increased from 13 to 26. They are under the authority of the canons of Windsor, and receive pensions from the order of the garter. They wear the arms of St. George and a red or blue cloak.—The famous chapels of Italy and other countries are mentioned in the articles upon the respective localities to which they belong.

CHAPELAIN, Jean, a French poet, born in Paris, Dec. 4, 1595, died there, Feb. 22, 1674. His father wished him to adopt his own profession of notary; but his mother, who had known Ronsard, roused his literary ambition, and he studied foreign languages and also medicine. He became a teacher of Spanish, and afterward was for 17 years in the service of the family of M. de la Trousse, grand provost of France, first as tutor and afterward as steward. After the arrival in Paris of Marini, the Italian poet, he wrote a preface for his *Adone*, translated into French *Guzman de Alfarache*, and dedicated odes to Richelieu, Mazarin, and other prominent men (1646-'57). Richelieu gave him a pension of 5,000 francs for his lessons in poetry, and consulted him in regard to the foundation of the academy, of which Chape-

lain was one of the first members. He regulated its functions, drew up the plan of a dictionary and a grammar, and was the literary reviewer of *Le Cid* on behalf of the new institution. In 1672 Colbert employed him in defining the position of contemporary writers for the guidance of the king in awarding pensions. His prose was better than his verse, and his *La Pucelle*, on which he had been engaged for 20 years, made him the butt of Boileau, and later of Voltaire, whose kindred work was published by him as a parody of Chapelain's. Nevertheless, after the publication of the first 12 cantos in 1656, six editions were rapidly sold within 18 months. The remaining 12 cantos were never published; the MS. of the whole work, revised by the author, is preserved in the national library, and several other MS. copies of the last 12 cantos are extant. He was a friend of Boileau, La Fontaine, Racine, and Molière. The last named, whom he had aided in his earlier comedies, dispensed with his literary assistance after Chapelain's luckless attempt in preparing for him a scene of *Les facheux*. He was however extremely popular, and his eulogy was pronounced by D'Alembert. He was a *gourmet*, and was said to have chiefly admired his mistress Mme. Chouars because of her excellent wines. His and Bachaumont's experience as fellow travellers are recorded in the *Voyage de Chapelle et Bachaumont*, one of his most popular works. Tenant de Latour published in 1854 his posthumous poems, together with *Le voyage d'Encausse*. A comic opera based upon the adventures of Chapelle and Bachaumont, was produced under that title in Paris in 1858.

CHAPEL HILL, a post village of Orange co., North Carolina, 28 m. N. W. of Raleigh; pop. in 1870, 2,799. It occupies a healthy and agreeable site on the New Hope river, an affluent of the Cape Fear, and is the seat of the university of North Carolina, an institution founded in 1789. (See NORTH CAROLINA, vol. xii., p. 494.)

CHAPIN, Edwin Hubbell, D. D., an American clergyman, born at Union Village, Washington co., N. Y., Dec. 29, 1814. Having finished his preparatory studies at a seminary in Bennington, Vt., he commenced preaching in Richmond, Va., where he became pastor of a congregation composed of Unitarians and Universalists. In 1840 he removed to Charlestown, Mass., in 1846 to Boston, and in 1848 to New York, where he was installed as pastor of the fourth Universalist church. Of this organization he still remains pastor, although the location of its place of worship has been twice changed during his pastorate. It first occupied a church in Murray street, which had been used for many years by a Dutch Reformed congregation; in 1842 the society removed to an edifice on Broadway, built for and long occupied by the Unitarian church of All Souls; and in 1866 completed the erection of its present house of worship in Fifth avenue at the

corner of Forty-fifth street. In 1856 Mr. Chapin received the degree of D. D. from Harvard college. Dr. Chapin usually preaches twice every Sunday. One discourse is written out, and the other is generally extempore, as far as form is concerned. He is also a favorite lecturer and brilliant popular orator. Besides several volumes of sermons, he has published "Duties of Young Men," "Duties of Young Women," "Characters in the Gospel," "Communion Hours," "Discourses on the Lord's Prayer," "Crown of Thorns," "The Beatitudes," "Moral Aspects of City Life," "Humanity in the City," "True Manliness," and "Discourses on the Book of Proverbs."

CHAPIN, Stephen, D. D., an American clergyman, born in Milford, Mass., Nov. 4, 1778, died in Washington, D. C., Oct. 1, 1845. He graduated at Harvard college in 1804, studied theology with Dr. Emmons, and in 1805 became pastor of the Congregational church in Hillsborough, N. H. Disagreeing with his church in reference to what was known as the "Half-way Covenant," his pastoral relation in Hillsborough was severed early in 1809, and he became pastor of the Congregational church in Mount Vernon, N. H. The controversy into which he had been drawn in Hillsborough led him to a more particular examination of the whole subject of church membership and church ordinances, the result of which was his adoption of the general views held by the Baptist denomination. He accordingly relinquished his charge in Mount Vernon in 1818, and in 1819 became pastor of the Baptist church in North Yarmouth, Me., where he remained till 1822, when he was appointed professor of theology in the college at Waterville, Me. In 1828 he became president of Columbian college at Washington, D. C., and continued to preside over it till 1841, when he resigned.

CHAPIN, William, an American instructor of the blind, born in Philadelphia in 1802. Much of his earlier life was occupied in literary pursuits. He was the author and publisher of a gazetteer and map of the United States, and of other works; and was for six years commissioner of schools in Yates co., N. Y., where he did much to advance the cause of education. In 1840 he was appointed superintendent of the Ohio state institution for the blind, and was successful in improving the system of education there, and in awakening public interest in the institution. Having investigated kindred institutions in various parts of the United States, he visited Europe in 1845, examined nearly all the public charities in England and Paris, and embodied the results of his investigations in a report to the Ohio legislature, "On the Benevolent Institutions of Great Britain and Paris." Resigning his post in Ohio in 1846, he removed to New York, and established a female institute and normal school, which he carried on till 1849, when he was appointed principal of the Pennsylvania institution for the instruction of the blind, in Philadelphia. He prepared the article

on the blind in the United States census report of 1860.

CHAPLET. See BEAD.

CHAPLIN, Jeremiah, D. D., an American clergyman, born at Rowley, Mass., Jan. 2, 1776, died at Hamilton, N. Y., May 7, 1841. He graduated at the college of Rhode Island, afterward Brown university, in 1799, and was tutor there for about three years. In 1802 he became pastor of the Baptist church in Danvers, Mass., where he remained till 1818, when he was selected to take charge of the literary and theological seminary in Waterville, Me. This institution was changed into a college in 1820, and Dr. Chaplin was elected its first president. He administered the government of the new college with success for about 12 years, when he became pastor of the Baptist church in his native town. Subsequently he was pastor of the Baptist church in Willington, Conn.

CHAPMAN, George, an English poet, born at Hitching Hill, Hertfordshire, in 1557, died in London, May 12, 1634. After studying two years in Trinity college, Oxford, where he was distinguished for his knowledge of the classics, he went in 1576 to London, where he enjoyed the friendship of Spenser, Shakespeare, Marlowe, and Jonson, and the patronage of King James and Prince Henry. He published a translation of 7 books of the Iliad in 1598; of 12 books in 1600; and of the whole poem in 1603. It is in the lofty 14-syllable English verse, and of a vigorous and imaginative character, more according with the spirit than the letter of the original. It has retained its popularity both with poets and scholars, though less polished and less accurate than later versions. Pope said that it was "something like what one might imagine Homer himself would have written before he arrived at years of discretion;" Waller could not read it without transport; and Keats has expressed his admiration of it in one of the most beautiful of his sonnets. Chapman afterward translated the Odyssey, the Homeric hymns, and portions of Ovid, Terence, Musæus, and Petrarch. He was also a voluminous writer of plays, only passages of which are now esteemed. He was associated with Jonson, Marston, and others in writing the comedy of "Eastward Ho!" which contained severe satirical reflections upon Scotchmen, and was therefore so distasteful to King James that he caused the authors to be for a short time imprisoned. An imitation of Terence, entitled "All Fools," was highly applauded by his contemporaries; and portions of his tragedy of "Bussy d'Ambois" were highly esteemed by Charles Lamb. A handsome edition of his translation of Homer was published in London in 4 vols. in 1858, and an edition of his complete dramatic works was announced in 1873.

CHAPMAN, John Gadsby, an American artist, born in Alexandria, Va., in the early part of this century. Early indicating his taste for design, he was enabled by the liberality of a

friend to visit Rome, and to study and practise his art there for several years. After his return to the United States he had a studio for some time in New York, but since 1848 he has resided in Rome. He has executed many original designs for the illustration of books. His principal paintings are the "Baptism of Pocahontas" for one of the panels in the rotunda at Washington, the "Israelites Spoiling the Egyptians," "Etruscan Girl," "A Donkey's Head," "The Last Arrow," and "First Italian Milestone." He has also published two books on drawing.

CHAPONE, Mrs. (HESTER MULSO), an English authoress, born in Northamptonshire in 1727, died at Hadley in December, 1801. She is said to have written a romance at the age of nine years, and she early studied several languages and treatises on morals and philosophy. Her first publications were the story of "Fidelia" in the "Adventurer," and some verses prefixed to Miss Carter's translation of Epictetus. In 1760 she married Mr. Chapone, who died within less than a year. In 1770 she accompanied Mrs. Montague to Scotland, and at her request soon after published her "Letters on the Improvement of the Mind." In a volume of "Miscellanies," which subsequently appeared, are several letters addressed by her to Richardson, controverting some of the maxims put forward by him in "Clarissa Harlowe."

CHAPPOO, a seaport of China, in the province of Che-kiang, 53 m. N. N. W. of Ningpo, in lat. 30° 40' N., lon. 120° 25' E. It is situated on the N. side of the estuary of the Tsien-tang, its suburbs lying along the shore, while the main town is at some distance behind them. Through the suburbs is conducted its extensive trade with foreign ports; while a canal connects the city itself with Hang-chow, and thus with the interior. Chappoo is an important entrepot in the trade between China and Japan; and although its harbor is shallow and unsafe, it has attained great importance as a port. It was the scene of a severe conflict in the opium war, when the heights near by, which had been fortified by the Chinese, were carried by the British after an obstinate resistance, May 18, 1842.

CHAPPE, Claude, a French engineer and mechanician, born at Brulon in 1763, died Jan. 23, 1805. Having invented an ingenious system of signals to communicate at a distance with his friends, he presented it to the French legislative assembly in 1792. It was successfully tried between Paris and Lille, on a length of 48 leagues, and was adopted by the government. Chappe established several lines in France, and the one running north was first put in motion to announce the recapture of the town of Condé from the Prussians. The inventor was at once rewarded by the convention, which by a decree appointed him *ingénieur télégraphe*. The lines were extended all over France, and the system was also adopted, with some alterations, through Germany and

England. The attacks to which he was subjected by persons jealous of his invention preyed so much upon his mind that he committed suicide.

CHAPPE D'AUTEROCHE, Jean, a French astronomer, born at Mauriac, Auvergne, in 1722, died in California, Aug. 1, 1769. He was a priest, but giving his whole attention to astronomy, he became one of the assistants of Cassini in delineating the general map of France, and edited the astronomical tables of Dr. Halley. In 1760 he was designated by the academy to make an observation of the transit of Venus over the sun's disk, which Halley announced would happen June 6, 1761. He consequently set out for Tobolsk in Siberia, which was pointed out as the most favorable point of observation. His mission was successfully accomplished; and returning to France at the end of two years, he published in 1768 his *Voyage en Sibérie*. The following year he sailed for California to observe another transit of Venus, which was to take place June 3. He was equally successful on this occasion, but died soon afterward. The results of his last expedition were published by C. F. Cassini, under the title of *Voyage de la Californie*.

CHAPSAL, Charles Pierre, a French grammarian, born in Paris in 1787, died near Joinville-le-Pont, department of the Seine, in 1858. His principal work, jointly with François Joseph Noël, *Nouvelle grammaire française, avec exercices*, passed from 1823 to 1858 through over 40 editions, having been adopted as a standard school book, and still used to some extent, though eclipsed by more recent grammars. He became wealthy by his writings, purchased the château de Polangis, devoted himself to charity, and bequeathed 80,000 francs to the teachers in the outskirts of Paris.

CHAPTAL, Jean Antoine, count de Chanteloup, a French chemist and statesman, born at Nogaret, Lozère, June 5, 1756, died in Paris, July 30, 1832. During his medical studies and practice he devoted much research to the science of chemistry, in which he soon became eminent, and was appointed professor at Montpellier, where he taught successfully the doctrines of Black, Lavoisier, and Cavendish. His uncle, a wealthy physician, left him a fortune, with which he established chemical works near Montpellier, being the first attempted of the kind, and by which he was soon enabled to produce various chemicals hitherto imported such as the mineral acids, alum, soda, and salts of lead. The authorities of Languedoc heaped honors on him; the Spanish government offered him a pension of 56,000 francs to go to Spain; and according to his biographer, Washington wrote three times to Chaptal inviting him to America. After the outbreak of the French revolution he published a political pamphlet, entitled *Dialogue entre un Montagnard et un Girondin*, and was arrested, but through the intercession of friends was liberated. The committee of public safety placed

him in charge of the saltpetre works of Grenelle. Returning to Montpellier, he was elected member of the institute, and devoted himself to science till Bonaparte summoned him to the council of state, where he had the supervision of national education. When Lucien Bonaparte resigned the portfolio of the interior, Chaptal took his place as minister, and retained it for four years. He founded the conservatory, school of arts, and society for encouragement of industry, introduced the modern French system of weights and measures, established a model farm and a system of distribution of agricultural seeds, reorganized the prisons and hospitals, extended the network of highways over the country, and originated the plans of extension of the Louvre and rues de Rivoli and Castiglione, afterward completed by Napoleon III. In the midst of his usefulness a misunderstanding arose between him and Napoleon; some accounts say, because Chaptal refused to report in favor of beet-root over cane sugar, while others assert that it was on account of the actress Mlle. Bourgoïn, to whom both emperor and minister paid their addresses. A reconciliation afterward took place, and the ex-minister was made count, senator, and grand officer of the legion of honor. On Napoleon's return from Elba, the count was appointed director general of commerce and manufactures. Louis XVIII. struck him from the list of peers, but left him on the roll of the academy. He was however restored to the chamber of peers in 1819. His works are all on chemical subjects, and may yet be consulted with advantage, especially his *Chimie appliquée aux arts* (4 vols. 8vo, Paris, 1806), and *Chimie appliquée à l'agriculture* (2 vols. 8vo, 1823).

CHAPTER, the community of canons or prebendaries attached to a cathedral or collegiate church, and presided over by a dean. (See **CANON**.) They govern the diocese during the vacancy of the see, in some countries have the right of choosing the bishop, and act as his advisers. In England the appointing privilege was assumed by Henry VIII. as a royal prerogative. Some of the Roman Catholic cathedrals in England have their chapters, but there are none in the United States. They were suppressed in France by the civil constitution of the clergy, but restored by the concordat of 1801. The title of chapter is applied not only to the canons in their collective capacity, but also to

their meetings, and to the place in which the latter are held. It is given to the assembly of members of a religious order, to the convocations of the military orders of the middle ages, and even to the meetings of certain corporations of mechanics and tradesmen. It was first used about the 8th century, and is supposed to have originated in the fact that at such sessions it was customary to read some or all of the chapters containing the rules of the community.

CHAPULTEPEC, a Mexican fortress, built upon a rock of the same name, 150 or 200 ft. high, about 2 m. S. W. of the city of Mexico. At the time of the war with the United States it was heavily armed, had a frontage of 900 ft., and defended a causeway which formed the approach to the city. At the base of the hill, in front, was the wall of an aqueduct; in the rear an old powder mill, known as Molino del



Chapultepec.

Rey. The castle was the seat of the national military academy, and was defended by Gen. Bravo and a picked force. Santa Anna, with the greater portion of his army, occupied the city of Mexico, and was in communication with Chapultepec. On Sept. 8, 1847, Gen. Scott first stormed Molino del Rey, then, under cover of a demonstration against the city, brought four batteries to bear upon the castle from an opposite ridge (Sept. 12), and after a fire of a day and a half made the attack in two columns, simultaneously upon the E. and W. sides of the fortress. The American loss was slight, the Mexican much heavier. The day after the fall of the castle the city of Mexico was occupied by the American forces.

CHARA, a genus of aquatic plants of the order *characeæ*, found in most parts of the world. In the United States they occur in the great lakes and in the large fresh-water lakes of New York, frequently growing with such luxuriance as to render the bottom green like a grassy

meadow. They are found in the fossil state, and are important to the geologist as characterizing groups of strata, as those of the fresh-water marl beds of the tertiary formation. The seed vessel of these plants is very tough, and is covered by an integument consisting of five spiral valves. The stems are longitudinally striated, and always turn in a contrary direction from the rings on the seed vessel.

CHARBAR (or **Choubar**) **BAY**, one of the best harbors on the coast of Beloochistan, in the Indian ocean. Ras Charbar, the E. point of the bay, is in lat. $25^{\circ} 16' N.$, lon. $60^{\circ} 35' E.$ On the E. side of its entrance is the town of Charbar, pop. 1,500, surrounded by a rampart of earth, and garrisoned by the sultan of Oman. North of this are the ruins of the Portuguese settlement of Teez, which was probably identical with the Tiz of Edrisi, and possibly occupied the site of the Træsa of Nearchus.

CHARCOAL, the solid residuum of the destructive distillation of wood. Exclusive of hygroscopic water and ash, it is composed of carbon, hydrogen, oxygen, and nitrogen, in proportions varying with the kind of wood, with its hygroscopic condition, with the temperature of the distillation, and with the duration of the process. It is insipid and inodorous; is a bad conductor of heat and a good conductor of electricity; is insoluble in water; is attacked by nitric acid with difficulty, and is but little affected by the other acids or by the alkalis. Its carbon constituent is exceedingly refractory to heat, and if secluded in a retort will neither fuse nor volatilize under the highest temperature that can be produced. It retains the organic structure of the wood from which it was produced, except when prepared at very high temperature, when it becomes a black, shining, porous mass, resembling fossil coal, with a considerable increase in density, and without a trace of organic structure. Charcoal always contains a certain percentage of ash derived from the wood of which it is made, but that percentage is much less than what is due to the respective weights of the original wood and the resulting charcoal, showing that a portion of the mineral matter in the wood has been carried off by the fluid distillates. Charcoal is excessively hygroscopic. A fresh preparation of it strongly attracts moisture from the moment it is exposed to the atmosphere, and the quantity thus absorbed at saturation varies with the temperature of distillation, and with the hygrometric and barometric conditions of the atmosphere. The lower the temperature at which the charcoal is produced, the greater the humidity of the air, and the higher the barometer, the greater is the percentage of moisture absorbed at saturation by the charcoal. Charcoal is hard and brittle; it rings when struck, and resists a strong pressure gradually applied, but is easily broken by a sudden blow, when it shingles like porcelain and shows a glossy, intensely black and glistening fracture, that scarcely soils the hand until after some expo-

sure to the air. The quantity of charcoal obtained from the same weight of wood in the same condition, and the ratio of its carbon constituent to its hydrogen, oxygen, and nitrogen, vary with the temperature and time of distillation; the lower the temperature and the shorter the time, the greater is the percentage of charcoal obtained, and this charcoal contains a greater percentage of hydrogen, oxygen, and nitrogen, and less of carbon; but the highest temperature and the longest application fail to wholly expel the volatile constituents of charcoal. The ordinary charcoal of commerce, prepared in heaps at the temperature of about $700^{\circ} F.$, has the density of 0.42 including its pores, and of 1.50 excluding them. In the merchantable state it weighs $15\frac{1}{2}$ lbs. per cubic foot, and requires $144\frac{1}{2}$ cubic feet of space to contain one ton. The following is its chemical constitution by weight, both including and excluding its ash and hygroscopic moisture:

	Inclusive of ash and Hygroscopic moisture.	Exclusive of ash and Hygroscopic moisture.
Carbon	70	80.46
Hydrogen	5	5.75
Oxygen	11	12.64
Nitrogen	1	1.15
Ash	2	....
Hygroscopic } moisture {	11	....
	100	100.00

When the distillation is done under a temperature of about $1,500^{\circ} F.$, charcoal has the density, exclusive of pores, of about 1.75, and the following chemical constitution by weight, both including and excluding its ash and hygroscopic moisture:

	Inclusive of ash and Hygroscopic moisture.	Exclusive of ash and Hygroscopic moisture.
Carbon	83.0	91.21
Hydrogen	2.5	2.75
Oxygen	5.0	5.49
Nitrogen	0.5	0.55
Ash	3.0	....
Hygroscopic } moisture {	6.0	....
	100.0	100.00

The ash of charcoal consists chiefly of carbonate of potash, silica, lime, and oxide of iron. When wood is distilled to the uttermost, at the temperature of $2500^{\circ} F.$, the resulting dry charcoal, exclusive of its pores, has a density of about 2, and contains about 3 per cent. of volatile matter. The specific heat of good charcoal, free from hygroscopic moisture, increases with the temperature, and in the following ratio: At $212^{\circ} F.$ the specific heat is 0.2415; at 392° , 0.2441; at 572° , 0.2467; at 752° , 0.2493; at 932° , 0.2519; at 1112° , 0.2545; at 1292° , 0.2571; at 1472° , 0.2597; at 1652° , 0.2623; at 1832° , 0.2649; at 2012° , 0.2675; at 2192° , 0.2701; at 2372° , 0.2727; and at 2552° , 0.2753.—Charcoal absorbs the fixed gases as well as aqueous vapor with great avidity, the volumes at standard temperature and pressure absorbed by the same charcoal varying with the temperature and pres-

sure of the gas; the lower the former and the greater the latter, the greater the absorption. In function of pressure alone, the temperature being constant, the same charcoal absorbs volumes of gas nearly, but a little less than, in the direct ratio of the pressure. The amount of absorption differs greatly for the charcoal of different woods, other things being equal; and for the temperature at which it was formed from the same wood, the lower that temperature the greater the absorption. If charcoal saturated with one gas be exposed to another gas, it will discharge a portion of the former and absorb a portion of the latter, so that it will contain both gases, but not in so great quantities of each as if it were exposed to each alone. Recently prepared charcoal exposed to the atmosphere absorbs the oxygen of the air to a greater extent than the nitrogen. Damp charcoal does not absorb gases so readily nor to the same quantity as that which is dry. Charcoal loses its property of absorption by use, but regains it completely by simple reheating. The absorption of gases is always accompanied by a rise of temperature in the mass. If dry charcoal saturated with sulphuretted hydrogen be introduced into oxygen, the gases combine with explosion and the production of aqueous vapor and sulphurous acid gas; just previous to the explosion a yellow vapor, that of the separated sulphur, exudes from the pores of the charcoal. If nitrogen be mixed with the oxygen, the above effect is produced more slowly, and the hydrogen alone of the sulphuretted hydrogen is combined, its sulphur being precipitated as a solid. The absorption by charcoal of gases and vapors attains its maximum in about 36 hours; and damp charcoal does not absorb them so readily as that which is dry. This absorbent property of charcoal is ascribed to catalysis, and resembles the action of spongy platinum on certain mixtures of gases; but there is this difference between the two substances, that platinum has the greater combining power, while charcoal has the greater absorbing power. Coarsely powdered charcoal boiled in a solution of the chloride of platinum until thoroughly soaked, and then heated to redness in a closed crucible, retains a portion of the platinum, and possesses remarkable powers of absorption and combination. Charcoal has a great deoxidizing power even at low temperatures; it is, in fact, the great reducing agent of metallurgists. Fresh-burned charcoal of boxwood, free of ashes, introduced into nearly neutral and very dilute solutions of gold, platinum, palladium, silver, and copper, precipitates the metals, which are deposited on the charcoal in thin films. The deposit of copper, if allowed to remain in the liquid, soon disappears. Zinc, iron, lead, and mercury are precipitated in the same manner, but redissolve in acid liquors. At a red heat charcoal deoxidizes many fixed and volatile metallic oxides (arsenious acid), reproducing their metal-

lic bases. At a white heat it deoxidizes even potassa, soda, and phosphoric acid, setting free in vapor potassium, sodium, and phosphorus. Charcoal produces in the cold a violent explosion with perchloric acid; and at a red heat it deoxidizes the chlorates, perchlorates, and nitrates, with deflagration, producing carbonates with the respective alkaline bases. At a full red heat it converts most of the sulphates to sulphites, and it decomposes water; but it has no action on the haloid salts, namely, the chlorides, bromides, iodides, and fluorides; neither does it decompose, even at a very high temperature, silica and alumina. When the vapor of water is passed slowly over charcoal heated to full redness in a porcelain tube, the resulting gas, called water gas, is composed by weight, in 100 parts, of hydrogen 56.03, carbonic oxide 29.15, carbonic acid 14.65, and carburetted hydrogen 0.17. The absorbing and deoxidizing powers of charcoal are greatly diminished by saturation with water. Charcoal has also a strong deodorizing power, referable to the same property. If air containing sulphuretted hydrogen be agitated with powdered charcoal, or if water containing sulphuretted hydrogen be filtered through charcoal, the offensive odor of that gas is speedily removed. The sulphuretted hydrogen is first absorbed, and then, by a catalytic action, its hydrogen unites with the oxygen of the atmosphere, while its sulphur is deposited. Charcoal absorbs coloring matters. Powdered charcoal agitated with solutions of dilute sulphate of indigo, of cochineal, of the blue iodide of starch, and of the red permanganate of potassa, entirely removes these colors. Port wine, by a similar process, is rendered tawny or light-colored; and impure solutions of sugar and nitre lose their color by filtration through a mass of charcoal. The taste of liquids in some cases is almost removed by filtration through charcoal when the taste depends on the presence of certain organic substances. The bitterness of the hop in ale is thus removed, and strychnia, too, is completely absorbed. The antiseptic power of charcoal is due to the action of its absorbed oxygen upon organic matter, under the influence of which the decomposition of such matter is quickened instead of retarded. Charcoal, by its possession of these properties of absorption, decomposition, and combination, is eminently fitted as a filter for the purification of water, removing from that liquid the color, odor, and taste of its impurities, by oxidizing and recombining them into other and inoffensive substances. The following gases stand in their respective order as regards their volumes at standard temperature and pressure, which are absorbed at saturation by dry charcoal; the first named being absorbed in least volumes, and the volumes increasing for each gas to the last named; the absolute number of volumes in each case varies enormously with the charcoal of different woods and with the

temperature at which it was made: 1, hydrogen; 2, nitrogen; 3, carbonic oxide; 4, oxygen; 5, marsh gas; 6, nitrous oxide; 7, carbonic acid; 8, olefiant gas; 9, sulphurous acid; 10, air; 11, sulphuretted hydrogen; 12, muriatic acid; 13, hydrochloric acid; 14, ammonia.

—When air-seasoned wood, that is to say, wood containing about 25 per cent. by weight of hygroscopic water, is slowly charred in heaps at a temperature of about 750° F., about one third of it is wholly consumed in producing the heat required for the charring, leaving two thirds for the portion charred. The dry charcoal produced is 16 per cent. of the total weight of wood; that is, of the sum of the weight consumed and the weight charred, or $\left(\frac{16 \times 100}{66\frac{2}{3}}\right)$ 24 per cent. of the latter. When the

wood is slowly distilled in ovens or retorts at the above temperature, then, as the same quantity of heat is required for producing the same effect, for every two pounds put into the retort one pound will be consumed beneath it to produce the heat for distillation. Of the two pounds thus distilled, 24 per cent. is obtained as dry charcoal; or, of the total weight of wood used, that is, of the sum of the weights consumed and the weight distilled ($\frac{2}{3}$ of 24), 16 per cent. is obtained as dry charcoal. Consequently, for equal weights used of the same wood, the process of distillation in retorts and that of charring in heaps are equally economical; in the former case, however, the gaseous and liquid distillates belonging to two thirds of the wood are saved, while in the latter case they are lost. When the charring or distilling is very rapidly done, the resulting weight of dry charcoal is only 14 per cent. of that of the wood charred or distilled; and the quantity of wood consumed in the production of the heat required for the charring or distilling is equal to the weight of wood charred or distilled; consequently, in this case, only 7 per cent. of the total weight of wood used is obtained as dry charcoal. The proportion of charcoal obtained from wood varies with the kind of wood, and for the same kind of wood it varies with the temperature and with the duration of the charring or distillation; the lower the temperature and the longer the duration of the process, the greater is the proportion of charcoal obtained. The charcoal also varies in chemical composition with the temperature and the duration of the charring or distilling process. The lower the temperature, other things being equal, the greater is the percentage of volatile matter and the smaller that of fixed carbon in the charcoal. The hygroscopic power of such charcoal is greater than of that prepared at higher temperatures. The longer the process of preparation is continued, other things equal, the less is the percentage of volatile matter and the more that of fixed carbon in the charcoal. The hygroscopic power of such charcoal is less than of that prepared with shorter processes. No

temperature at the command of man, and no time of distillation, will wholly expel the volatile constituents of charcoal, namely, the hydrogen, oxygen, and nitrogen.—The inflammability of dry charcoal varies with the kind of wood from which it is made; and for the same kind of wood it varies with the temperature and with the duration of the charring or distillation; the lower the temperature and the shorter the duration of the process, the more inflammable is the charcoal. The relative inflammability is measured by the temperature of ignition; the lower that temperature, the more inflammable is the charcoal. The inflammability depends on the porosity of the charcoal and on the percentage of its volatile constituents, and both these are greater the lower the temperature of the charring or the distillation and the shorter the time. After a brief exposure of dry charcoal to the atmosphere, its large absorption of hygroscopic moisture materially modifies the above relations, and tends to equalize its inflammability, as the lower the temperature and the shorter the process of the charring or distillation, the more hygroscopic is the charcoal, and consequently the higher is its temperature of ignition. The temperatures of ignition of dry charcoal prepared at various temperatures are as follows:

Temperature of the Charring.	Temperature of Ignition.
500° F.	650° F.
600	700
1000	750
2000	1100
3000	1450

It is obvious that the dryer the wood, the greater is the percentage of charcoal obtained from it, and the less is that of the wood required to be consumed in producing the heat for the charring or distillation; for the uncombined water in the part of the wood charred or distilled is entirely driven off as aqueous vapor during those processes; while in the part of the wood consumed to produce the heat for the charring or distillation, the uncombined water is not only driven off, but also absorbs for its evaporation a portion of the heat due to the combustion of the ligneous matter. A further portion of that heat is taken, too, for the evaporation of the water in the part of the wood charred or distilled, so that the greater the quantity of uncombined water in a given weight of wood, the greater is the percentage of the part required to be consumed in producing the heat for the charring or distilling. Thus, of the total weight of wood used, that is, the sum of the weight charred or distilled and consumed in producing the heat for the charring or distillation, the effect of the uncombined water is to diminish the charcoal product more largely than is due to the simple subtraction of that water by the amount of wood consumed for its evaporation. This is the only result attending the presence of water in the wood when the temperature of the charring or dis-

tillation is kept below that of a red heat. If that temperature be exceeded, however, the aqueous vapor, in passing over the red-hot charcoal, reacts upon its carbon constituent and converts a portion of it into carbonic acid, carbonic oxide, and carburetted hydrogen; all of which pass off in the gaseous form, diminishing the charcoal products by the amount of carbon they contain. If, of two equal weights of the same wood containing equal weights of uncombined water, one weight be dried while the water is allowed to remain in the other, the two masses will contain equal weights of ligneous matter; and if they be charred or distilled at less than a red-heat temperature, under the same conditions, the same weight of charcoal will be obtained from the charred or distilled part of each. One pound of charcoal, having the chemical constitution given for it in the early part of this article, develops sufficient heat by combustion in oxygen to raise the temperature of 12,306·414 lbs. of water, at the temperature of 32° F., one degree, or to evaporate under the atmospheric pressure 12·743 lbs. of water from the temperature of 212° F. One pound of what remains of this charcoal, after deducting its ash and hygroscopic water, will develop sufficient heat by combustion in oxygen to raise the temperature of 14,288·837 lbs. of water, at the temperature of 32° F., one degree, or to evaporate under the atmospheric pressure 14·796 lbs. of water from the temperature of 212° F. Equal weights of charcoal from all varieties of wood, prepared under equal conditions, have the same heating power.—In the ordinary mode of manufacturing charcoal in heaps, the sticks of wood are piled up, sometimes in horizontal and sometimes in vertical layers, around a central opening which extends from the bottom to the top of the heap. The heaps are conical or hemispherical, from 10 to 30 or 40 ft. in diameter, and of a height of about 12 ft.; their outer surface, after being made even with chips and twigs, is covered with small branches, leaves, straw, or moss, upon which sods are laid together with the charcoal dust of previous burnings. This dust is mixed with sufficient earth to give it consistency, and when moistened the mixture makes the best of all coverings. The sticks of wood to be charred are of any convenient size, and are closely packed, the interstices of the larger sticks being filled with smaller ones. The central vertical opening in the heap is left for a chimney, and for the introduction of the fire to ignite the heap; to facilitate the latter, a horizontal opening is left in the bottom of the heap, extending from its periphery to the central opening. Around the bottom of the heap other smaller openings are made for the admission of air and the escape of the volatile products. As the charring process proceeds, these small openings are closed, and new ones made nearer the top of the heap, and in other places, as it is found desirable to check the process in some parts and to hasten it

in others. The heap is fired in the centre at the bottom, and the fire gradually spreads in all directions, but especially toward the openings by which the air is admitted. The first matter that escapes is aqueous vapor, which partly condenses in the cover of the heap, moistening it, and then passes off with a yellowish color. After the vapor disappears, it is followed by a lighter-colored smoke that becomes black and dense, emitting the odor of pyroligneous acid, which grows stronger to the end of the process. The carbonization, first completed at the centre and top of the heap, gradually extends down its sides; and in a heap half charred, the finished portion has the form of an inverted cone, the apex of which is at the bottom of the vertical axis of the heap. As the line between the finished and unfinished portions moves downward, the openings for the admission of air are kept in advance of it, and upper openings are closed as lower ones are made. The completion of the charring of each part of the heap is indicated by the smoke emerging from that part changing from its black and dense appearance to a transparent light bluish color. The tarry matters, which collect mostly toward the close of the operation, run out in channels made for that purpose beneath and around the heap. When the entire heap is completely charred, all its openings are closed, and it is then left for one or two days, after which it is partially uncovered and the charcoal drawn out and spread around in thin layers. This is best done at night, so that if any of the charcoal remains ignited, it can be quickly seen and quenched. The time required for the process varies with the size of the heap and the state of the weather. Small heaps may be charred in a week, and large ones may require three weeks. A common yield from one cord (128 cubic feet) of wood is about 30 bushels of charcoal.—Animal charcoal has been described under **BONE BLACK**.

CHARDIN, Jean, a French merchant, born in Paris in November, 1643, died in London in January, 1713. He went to the East to trade in jewelry, became the favorite purveyor of the shah of Persia, and eventually produced a book of his travels and experiences in that country, which has been found true by subsequent travellers, and translated into many foreign languages. The London edition of 1686 contains only the description of his journey to Ispahan. Complete editions of the work, which is entitled *Journal du voyage du chevalier Chardin en Perse et aux Indes Orientales, par la Mer Noire et par la Colchide*, appeared in 1711 and 1735. The most highly valued edition is that of Langlès, the orientalist, who enriched it with a map, and with an abridged history of Persia (Paris, 1811). A Protestant by birth, Chardin was compelled on his return from the East in 1681 to seek refuge in England, where he was knighted and appointed agent of the East India company in Holland.

CHARDIN, Jean Baptiste Siméon, a French painter, born in Paris about 1699, died Dec. 6, 1779. The son of a workman, and without teachers, he yet reached eminence, and became a member of the academy in 1728. He excelled in painting still life, flowers and fruits, and subsequently in delineating the life of the middle classes. His *Bénédictité* in the Louvre, representing a woman reciting prayers before dinner to her two children, gave him a wide reputation, and was regarded by Diderot as superior even to Greuze. He was in his 80th year when he exhibited his "Jacquet;" and shortly after he painted an admirable portrait of himself, which is in the Louvre.

CHARENTE, a W. department of France, bordering on the departments of Vienne, Haute-Vienne, Dordogne, Charente-Inférieure, and Deux-Sèvres; area, 2,294 sq. m.; pop. in 1872, 367,520. It is formed principally out of the ancient province of Angoumois, and derives its name from the river Charente, by which it is drained. The soil is generally far from being fertile. There are many shallow ponds, called *étangs*, some of them of considerable extent. Numerous caverns, some of great depth, are found, among which that of Rancogne, near La Rochefoucauld, is particularly remarkable. It seems as if earthquakes had been once frequent here. Two rivers, the Tardouère and the Bandiat, the course of which is toward the Charente, disappear repeatedly, and finally are entirely lost before reaching that river. There are mines of iron, antimony, and lead, and quarries of free and rag stone. The grain crop is poor, and scarcely sufficient for home consumption; but the vineyards, covering about 24,000 acres, yield a considerable surplus. Their produce is mostly converted into brandy, the superiority of that made at Cognac being universally acknowledged. Hemp, flax, and potatoes are extensively cultivated. Truffles are abundant, as well as chestnuts. Cattle, mules, and asses are numerous; horses are comparatively scarce. Game, fish, poultry, and bees are found in abundance. Besides large iron works connected with the mines, there are paper mills, especially at Angoulême, distilleries, manufactories of earthenware, &c. The export trade is mostly in brandy, which is forwarded to nearly all parts of the world. Nearly 900 fairs are annually held in the department. It is divided into the arrondissements of Angoulême, Ruffec, Cognac, Confolens, and Barbezieux. Capital, Angoulême.

CHARENTE-INFÉRIEURE, a W. department of France, on the Atlantic coast, bordering on Vendée, Deux-Sèvres, Charente, Dordogne, and Gironde; area, 2,635 sq. m.; pop. in 1872, 465,653. Besides being intersected by the Charente, it is watered on the N. frontier by the Sèvre-Niortaise, and on the S. by the Gironde, which offer great facilities to exterior commerce. There are several other navigable streams, and a canal connecting La Rochelle with Niort. The climate is agreeable; the surface is flat,

and partly covered, especially in the neighborhood of the sea, with marshes yielding large quantities of salt. There are quarries of freestone; peat, and fine sand for the manufacture of glass, are also found. The soil is mostly calcareous or sandy, but yields large crops of grain and wine. Large quantities of brandy are exported. Cattle, horses, and sheep are raised in great numbers. Oysters are sent to Paris and London. Sardines form an important branch of trade, and vessels are fitted out for the cod fishery. La Rochelle, Rochefort, and the other ports have a considerable share of the colonial and coasting trade of France. There are manufactories of coarse woollen stuffs, soap, fine earthenware, and glass, with tanneries and sugar refineries. The islands of Oléron, Ré, and Aix lie near the coast of this department. It is divided into the arrondissements of La Rochelle, Rochefort, Marennes, Saintes, Jonzac, and St. Jean d'Angély. Capital, La Rochelle.

CHARENTON-LE-PONT, a town of France, in the department of Seine, on the right bank of the Marne, near its confluence with the Seine, 5 m. S. E. of the centre of Paris; pop. in 1866, 6,190. It derives its surname from the fine bridge which, crossing the Marne, unites the town with the village of Alfort. This bridge has been always considered as of great importance for the defence of Paris, and is protected by the fort of Charenton, near Alfort, which guards the passages of both rivers.

CHARENTON-ST.-MAURICE (the name changed to St. Maurice since 1842), a village of France, in the vicinity of Paris, on the right bank of the Marne, about 1 m. E. of Charenton-le-Pont; pop. in 1866, 4,931. It contains an excellent lunatic asylum, founded in 1741, and capable of accommodating 500 patients. The Protestants formerly had here a large church, in which several synods were held; but it was demolished in 1685, on the revocation of the edict of Nantes.

CHARES. I. An Athenian general, first mentioned in 367 B. C., when he was sent to the aid of the Phliasiens, whom he relieved from siege by the Arcadians and Argives. He was next sent to take command against Oropus, and in 361 succeeded Leosthenes, who had been defeated by Alexander of Pheræ, and, sailing to Coreyra, aided an oligarchical conspiracy to overthrow the democracy, a proceeding that resulted in the loss of that island to Athens at the outbreak of the social war. Sent to Thrace in 358, he compelled Charidemus to ratify the treaty he had made with Athenodorus. The following year, with Chabrias, he commanded the forces in the social war, and made an unsuccessful attack upon Chios, in which his colleague was slain. In 356 Iphicrates and Timotheus were joined with him in the command; but he soon procured their recall by accusing them to the people, and entered into the service of Artabazus, the revolted satrap of western Asia. This act was at first ap-

proved but afterward condemned by the Athenians. He subsequently led an expedition against Sestos, which town he took, and served with little success in the Olynthian war. In 346 he was in command in Thrace, but seems to have been engaged in private plunder rather than in fighting the enemy. In 340 he was sent to aid the Byzantines against Philip, but his character was so distasteful to them that they refused to receive him. In 338 he was one of the Athenian generals at the disastrous battle of Chæronea. He appears to have died at Sigeum a few years afterward. He was not endowed with superior military ability, yet was apparently the best qualified Athenian of his time for command. He seems to have won and maintained his ascendancy over the people partly by his athletic figure, partly by flattery and corruption. **II.** A Grecian statuery in bronze, the designer of the statue known as the colossus of Rhodes, was a native of Lindus, the favorite pupil of Lysippus, and flourished in the beginning of the 3d century B. C.

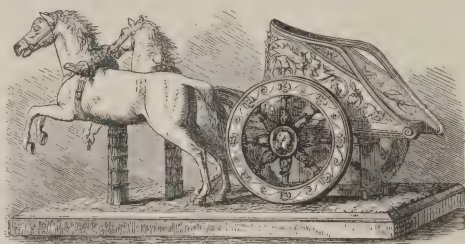
CHARETTE DE LA CONTRIE, François Athanase, a Vendean soldier, born at Couffé, April 21, 1763, executed in Nantes, March 29, 1796. He was a member of an ancient Breton family, his branch adding the surname La Contrie after their manor. He was educated at the college of the Oratorians in Angers, entered the navy in 1779, and took part in the American war. He was among the *émigrés* after the outbreak of the revolution, but soon returned to Paris, took part in the defence of the Tuileries, and then retired to his estates in Brittany. In March, 1793, the peasantry obliged him to become their commander, and gaining several victories over the republican troops, he was soon regarded as the insurgent leader in lower Vendée, and shared with Stofflet in the supremacy of the whole royalist camp, especially after the execution of their commander Marigny for neglect of duty, by order of a court martial. The count d'Artois promoted him to the rank of lieutenant general in July, 1794, and he soon assumed supreme authority in lower Vendée. A treaty of peace, signed Feb. 19, 1795, proving abortive, Charette resumed a guerilla warfare which was now more hopeless than ever, owing to Hoche's energetic operations as commander-in-chief of the republican army. But though completely exhausted, and finally routed, he nevertheless urged upon the allies the recognition of Louis XVIII. Declining the most honorable terms of capitulation, with only 33 men he attempted on March 23, 1796, to fight his way through the republican ranks, but was wounded, captured, and taken to Nantes, where he was shot by sentence of a court martial. The future Louis XVIII., who called him "the second founder of the monarchy," delivered a speech in his honor at the commemoration of his death, celebrated on May 6, 1796, at the headquarters of Condé's army.

CHARGÉ D'AFFAIRES, the title of the fourth rank of diplomatic agents. They are accredited

not to the sovereign but to the department of foreign affairs, and are appointed by and responsible to the minister of state of their own country. They were not recognized in European diplomacy till near the 18th century. By the congress of Vienna in 1815 they were made the third order of diplomatists, which was changed to the fourth by the congress of Aix-la-Chapelle in 1818. The title is given to the agent whom an ambassador or envoy, by virtue of authority from his prince or state, appoints to conduct in his absence the affairs of his mission.

CHARITÉ, La, a town of France, in the department of Nièvre, situated on the Southern railway and on the right bank of the Loire, over which there are two bridges, 12 m. N. N. W. of Nevers; pop. in 1866, 4,870. It has manufactures of coarse jewelry and earthenware and woollen stuffs.

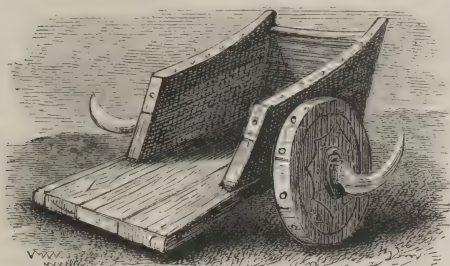
CHARIOT, among ancient nations, a two-wheeled carriage, open above and behind and closed in front, and used in war, in public games, and for the purposes of common life. The axle of the Greek chariot was usually made of oak, ash, or elm, though Homer describes the chariots of Juno and Neptune as having metallic axles. The wheels were about



Roman Chariot.

four feet in diameter, and each consisted of a nave bound with an iron ring, of spokes, a felly of elastic wood, and a heavy iron tire. They were fastened to the axle by pins, and the overthrow of Enomaus in his contest with Pelops was caused by the treachery of his charioteer, who inserted a linchpin of wax. The Lydians and Romans sometimes attached two or three poles and spans of horses to their chariots, but the Greeks rarely added a third horse. From the earliest historic periods chariots were used in war both by the Asiatic and the classic nations. The famous scythe chariots, whose spokes were armed with long hooks and sickles, were chiefly used by the ancient Persians, Britons, and Gauls. The warriors of highest rank among the Hebrews, Greeks, and Romans either fought from their chariots, or sometimes in close combat dismounted. In the Roman games chariots were often decorated with sculptures and enriched with gold and ivory. The triumphal chariot, which was usually made of ivory, adorned with the utmost skill, and drawn by four white

horses, was one of the chief ornaments in the celebration of a victory. The chariot was an



British Chariot.

attribute of the mythologic divinities, especially of Victory, Night, Apollo, and Diana.

CHARISTICARIES, the name applied in Greek ecclesiastical history to functionaries who possessed uncontrolled power over the revenues of hospitals and monasteries. The practice originated during the iconoclastic struggle in the 8th century, and resulted from hostility to monasticism. In after times the custom was continued without the spirit which originated it, and monasteries were often given to persons of wealth and rank in order to secure their patronage and influence.

CHARITON, or *Grand Chariton*, a river which rises in Lucas co., Iowa, and flows S. E. through Appanoose co. to the Missouri boundary. Thence it follows a S. course to the Missouri river, which it joins near the S. extremity of Chariton co., Missouri. It is about 250 m. long, and is navigable for 50 m. The East Chariton and Middle fork are its principal branches.

CHARITON, a N. central county of Missouri, intersected by Chariton river, and bounded S. W. by the Missouri and W. by Grand river; area, 740 sq. m.; pop. in 1870, 19,136, of whom 2,800 were colored. Yellow and Wolf creeks furnish water power. The soil is fertile and adapted to pasturage. The surface is gently undulating and covered with forests and prairies. Stone coal and limestone are found in large quantities. The North Missouri railroad crosses it. The chief productions in 1870 were 205,851 bushels of wheat, 919,288 of Indian corn, 205,914 of oats, 65,593 of potatoes, 4,137 tons of hay, 219,697 lbs. of butter, 39,833 of wool, and 2,993,981 of tobacco. There were 6,169 horses, 1,973 mules and asses, 5,280 milch cows, 8,085 other cattle, 15,689 sheep, and 27,461 swine. Capital, Keytesville.

CHARITY, *Brothers of*, a religious order in the Roman Catholic church, established at Seville by St. John of God in 1540. He hired a house to harbor poor sick persons, in which he provided for them and served them himself with great devotion. This pious work of charity attracted the attention of the whole city, and gradually persons of the same disposition as John came to aid him in his undertaking. His

institution was approved by the archbishop, but the members of it had neither rule nor habit, and it did not receive the approval of the pope until after the death of its founder. In 1572 Pius V. gave it the rule and habit of St. Augustine. Maria de' Medici introduced the order into France in 1601. Henry IV. granted it letters patent in 1602, and it soon numbered several houses in that kingdom. The hospital La Charité in Paris, and that of Charenton, were the most important. The brothers of charity not only nursed the sick, but were frequently skilful surgeons. In Spain these religious were called brothers of hospitality, and in Italy *frate ben fratelli*. They are now almost extinct. The various orders of brothers hospitaliers have been superseded by sisterhoods.—A new religious order of brothers of charity was founded in 1828 by Cardinal Rosmini-Serbatì. They possess several flourishing houses in England.

CHARITY, *Sisters of*, a religious congregation founded by St. Vincent de Paul in the vicinity of Paris about the year 1633, with the coöperation of Mme. Le Gras, a pious and charitable lady. The object of this institution was the care of the poor, especially of the sick, and the education of children; and its members are everywhere the servants of the poor, which name was conferred on them by the archbishop of Paris when he gave them his formal approbation in 1655. Prisons, free schools, hospitals, and almshouses were at once placed under their direction in all parts of France. The congregation was soon invited to take charge of similar institutions in other countries, and the sisters of charity are now to be found in almost every civilized land. Louis XIV. granted letters patent to this institution in 1657, and they were finally confirmed by the legate of the pope in 1660. The charity and devotion of these women had made them so useful to all classes, that even the revolution spared them. They continued their work of beneficence secretly, but without restraint. One of the first acts of the new government was to open to them a field of usefulness, and Napoleon placed them under the protection of his mother. They make simple vows, which are renewed every year. In 1862 the number of establishments was 1,064, viz.: 947 in Europe, 80 in America, 17 in Asia, 17 in Africa, and 3 in Australia and Oceania. The number of members was estimated at 28,000. The American branch of this congregation was established at Emmetsburg, Md., in 1809, by Mrs. Eliza Seton, their first mother superior. The foundation of Mrs. Seton until within a few years remained a quite distinct establishment from the French order; but of late a great portion of the American sisters of charity have adopted the French dress and rule. The New York mother house and its dependencies, however, still retain their original independence. In 1873 there were in the United States 156 houses belonging to the sisters of charity.

CHARIVARI (Fr. *charivari*; Ger. *Katzenmusik*; Sp. *concezada*; It. *scampanata*), a mock serenade, which was performed in the middle ages whenever an old man married a young girl, or when a man married for the second or third time, or generally when ill-assorted marriages took place. The neighbors assembled on such occasions during the night before the house of the wedded pair, with all sorts of pans and kettles, and iron and copper utensils (*chalybaria*), producing every variety of discordant noises, and accompanying them with derisive shouts and songs. The charivariists usually continued their uproar until their wrath was soothed by drink or food. The council of Trent attempted to put a stop to this nuisance, which frequently occasioned disturbances. In some French towns, as for instance in Lyons, the practice was maintained as late as the 16th century. In Canada, and in Louisiana and many other parts of the United States, it exists, though it is everywhere on the decline. In Brittany the term charivari was also applied to aggravated collisions between husband and wife. Xantippe throwing a jug of water at the head of Socrates is the most classic type of this sort. In the game of ombre the turn of four queens is called charivari. The Germans possess a work on the origin of *Katzenmusik* by Philipps (Freiburg, 1849). French literature boasts of a still more comprehensive work on the same subject: *Histoire, morale, civile, politique et littéraire, du charivari, depuis son origine vers le 4me siècle*, by Dr. Calybariat de St. Flour, with a supplement by Eldi Christophe Bassinet.

CHARLEMAGNE, Emperor of the West. See CHARLES I. (GERMANY).

CHARLEMONT. See GIVET.

CHARLEROI, or **Charleroy**, a town of Belgium, in the province of Hainaut, situated on the Sambre, and connected by railroads with Brussels, Namur, and Paris, 28 m. S. of Brussels; pop. in 1866, 12,150. The glass works here are the most extensive in Belgium. The annual yield of the collieries in the vicinity is estimated at 3,000,000 cwt. There are about 6,000 nail makers in the adjoining country, and 70 blast furnaces, 50 iron founderies, and 90 coal pits, almost all of which have sprung into existence within the last 50 years. There are also tanneries, dyeing establishments, ropewalks, salt and sugar refineries, and factories for spinning wool. It is the chief seat of the Protestant missions in Belgium, and has had a Protestant church since 1850. The fortress was commenced under Charles II. of Spain in 1666, and completed by Vauban for Louis XIV. It is a hexagon, with five counterscarps, two horn-works, and five ravelins. It has changed masters several times, and in 1794 stood a vigorous siege, and held out until all the advanced works were levelled with the ground, and until four assaults had been made by the French, when it capitulated. It was restored in 1816 under the direction of the duke of Wellington.

CHARLES, a S. W. county of Maryland, separated from Virginia by the Potomac river, and bounded N. E. by the Patuxent; area, 450 sq. m.; pop. in 1870, 15,738, of whom 9,318 were colored. The surface is uneven and the soil rather inferior. The forests consist mainly of oak, chestnut, ash, cedar, and locust. The chief productions in 1870 were 73,028 bushels of wheat, 221,726 of Indian corn, 50,813 of oats, 987 tons of hay, 53,878 lbs. of butter, 11,428 of wool, and 2,102,739 of tobacco. There were 2,004 horses, 1,676 milch cows, 4,960 other cattle, 3,872 sheep, and 6,978 swine. Capital, Port Tobacco.

CHARLES. The more important sovereigns of this name will be treated according to the alphabetical order of the countries over which they ruled, viz.: 1, England; 2, France; 3, Germany; 4, Naples; 5, Sardinia; 6, Savoy; 7, Spain; 8, Sweden; 9, Würtemberg. These are followed by minor princes of the name, sovereign and non-sovereign.

I. ENGLAND.

CHARLES I., the second of the house of Stuart who sat on the English throne, third son of James VI. of Scotland and I. of England, and Anne, daughter of Frederick II. of Denmark, born at Dunfermline, Fifeshire, Scotland, Nov. 19, 1600, executed in London, Jan. 30, 1649. He became heir apparent to the crown of England on the death of his elder brother, Prince Henry, in 1612, was created prince of Wales in 1616, and succeeded his father as king in 1625. He early fell under the influence of his father's favorite, the duke of Buckingham, and in 1623 went with him secretly to Madrid, to confirm his marriage contract with the Spanish infanta. They travelled under the names of John and Thomas Smith, and arrived at the house of the earl of Bristol, the English ambassador, on the evening of March 7. They spent some months in Madrid, but the marriage, which was hateful to the people of England, appears not really to have been desired by Charles; and when he left, Sept. 9, the marriage articles, although formally confirmed, were in fact set aside, Buckingham being resolute against them, while the prince probably agreed with his companion. This early enterprise was most unfortunate, as being a beginning of that course of dissimulation and insincerity which was the great defect of Charles's whole career. There was great joy in England that the match was broken off. Buckingham assumed the credit of the deed, but soon arranged a marriage with the princess Henrietta Maria, daughter of Henry IV. of France and his second wife, Maria de' Medici, at least as great concessions being made to the English Catholics, in order to gratify the French king Louis XIII., and his minister Richelieu, as had been demanded by the court of Spain, against which war was simultaneously declared. James I. died, however, before the marriage was even ratified. But on March 30, 1625, three days

after the accession of Charles, the ratification took place, and after the lapse of about three months, during which delays occurred owing to the illness of Louis, the queen was received by Charles at Dover, formally married by him at Canterbury, and installed at Hampton court, the entrance of the royal party into the metropolis being prevented by the ravages of a terrible pestilence, said to be the most destructive within the memory of man. The marriage itself was inauspicious; all its influences, both social and political, were of evil consequence to both king and kingdom; and the wife of Buckingham's bestowal was, to say the least, as fatal to the prospects of Charles as were the teachings and example of that minister, and the animosity excited against the crown, among the commons, by his baseness. Charles I. had education, some accomplishments, and a calm, grave demeanor. He had, moreover, a personal purity of morals and dignity of virtue which gave a new tone to the court upon his accession. But he lacked quickness of perception, and was very hard to convince or persuade; while his age was an age of transition, when new ideas were working, and new issues arising, demanding the most original as well as the most firm statesmanship. James had continually talked about his royal prerogative. Charles tried consistently to establish and maintain the ideas of which his father had been content merely to talk. To the end of his life he adhered steadily to the autocratic notions with which he began. On the other hand, he had learned to dissemble; dissimulation was what his father had called "kingscraft;" and Charles continually sought to secure power by this means, and to one supposing his concessions to his people sincere he appears weak and vacillating. His public course was changeable and fickle, but his letters to his queen and confidants reveal his duplicity, and his consistency to his first idea. His first parliament met June 18, 1625. It was not lavish in granting supplies, and was dissolved Aug. 12, and the king levied taxes and raised loans by his own authority, to carry on the war against Spain. On Feb. 6, 1626, a second parliament met, and was as unready to vote money as the first. It also impeached Buckingham, whose unpopularity was now great. Charles dissolved the parliament, imprisoned some of the leaders of the opposition, and then raised money again by his own authority. He also billeted soldiers on the people and proclaimed martial law in places. Although already at war with Spain, he plunged into another war with France, and tried to carry on both by forced loans and other illegal expedients. But all expedients were inadequate, and he was at length forced to call a third parliament, which met March 17, 1628. In this body the opposition was stronger than ever, and framed a "petition of right," which claimed that the king should not levy taxes except with the concurrence of parliament, nor subject the people to trials by courts martial, nor im-

prison any subject without due process of law. Upon his assent to this was conditioned any grant of money. Charles at length agreed to the petition, and there was great rejoicing among the people; but after getting the money voted, he imprisoned Eliot and other distinguished members of the house of commons. In the mean time the English arms were covered with disgrace; yet still the king persisted in retaining Buckingham at the head both of his councils and of his army, and that favorite was on the point of again setting sail from Portsmouth at the head of an expedition to the coast of France, when he was assassinated by a man named Felton. The expedition sailed under another commander, but was too late and too inefficient to relieve La Rochelle, which, after having had the most positive assurances of relief from Charles, and after incredible sufferings, was obliged to surrender. Parliament reassembled, after its recess, Jan. 26, 1629, but gave little comfort to the king, and on March 10 he dissolved it, with such expressions as were understood to preclude the assembling of another; and from this time till April, 1640, he tried to rule without a parliament. Upon the dissolution of parliament in 1629, Wentworth, afterward Lord Strafford, who had been one of the opposition leaders, attached himself to the king. He was a man of great ability, but of unscrupulous character. He resolved to make Charles in fact the absolute monarch which he claimed to be, and he saw that the means to this end was a standing army. At the same time the ecclesiastical government of England was confided to Laud, who was made archbishop of Canterbury. Charles was a devoted churchman, and made as much of Laud's ecclesiastical work as of Wentworth's political schemes. It is doubtful whether the nation would not have submitted to Wentworth and endured a military despotism, had not the religious tyranny of Laud goaded the people into rebellion. Wentworth revived the court of the star chamber, and organized the council of York, by which the whole administration of justice was put under arbitrary control, while the high commission exercised a similar tyranny in ecclesiastical matters. The king raised "ship money," and Hampden and others who resisted the illegal tax could get no redress. By the extreme high church assumptions of Laud, the Puritans of England were led to believe that Charles and his primate were bent on reintroducing the ancient worship of the Roman Catholic church; and although the suspicion was not true, yet, knowing that it existed, none are to be blamed but they for persisting in a course of conduct which could but aggravate and confirm it. Ireland, in the mean time, by the oppressive government of Wentworth, whose only object was to raise money in order to meet his master's exigencies without resorting to the aid of parliament, was driven to the verge of rebellion. Scotland, maddened by the king's attempt, at the instiga-

tion of Laud, to force episcopacy upon her contrary to the fundamental law of the kingdom, rose in arms, invaded England, and gained possession of Northumberland and Durham. The king made a fruitless attempt to raise funds to oppose the Scottish armies by summoning a parliament, but which, as it proceeded, like the last, first to consider grievances, he dissolved on May 5, 1640, within 20 days after its assembling, before it had given any positive reply to his demand for supplies. Tyranny in church and state was now at its worst. Torture was inflicted for the last time in May, 1640. At this time Charles had a fleet of above 60 ships at sea, which he maintained by the illegal levy of ship money; but he had no army on which he could depend, nor any means to raise one. Therefore, unless he would see the Scots march to York and take possession of the northern metropolis, there was no resource but to convoke the great council of the peers at York, who immediately demanded the assembling of the parliament, and to treat with the Scottish rebels. On Nov. 3, 1640, assembled the body known in history as the long parliament. Its first act was to impeach and then to proceed by attainder against both Laud and Strafford, the latter of whom was condemned and executed, abandoned by the king, for whom he had made great sacrifices. Some just and salutary laws were passed by this parliament; some illegal practices, which had been usual with the later English monarchs, were repressed; some grievances redressed; some rights of the subject firmly established. It also passed a bill that it should not be dissolved except with its own consent. This act was plainly unconstitutional, but was approved by the king. The star chamber and high commission were abolished, and on Dec. 31, 1641, the house voted to consider on Jan. 3 the question of the militia. On Jan. 2 the king sent his refusal to the commons to appoint a guard for their security, but promised solemnly, on his word as a king, that their security should be his sacred care; but the next day his attorney general appeared at the bar of the house of lords, and in the king's name accused of high treason Lord Kimbolton and five members of the commons, Pym, Hollis, Hampden, Haslerig, and Strode. These were accused of endeavoring to subvert the fundamental law and deprive the king of his regal power, of alienating his subjects and army, of encouraging foreign invasion, and conspiring to levy war against him. These charges were for the most part aimed against their parliamentary conduct. The king demanded their arrest, and the next day came to the house in person to arrest them by armed force; but the five members had absented themselves by permission of the house. The excitement in parliament and in the city was unparalleled. Some of the king's partisans wished to seize the six members, who were known to be in a house in Coleman street; but the king chose to de-

mand them of the common council, and on the 8th he issued a proclamation for their arrest. The manifest unpopularity of his cause made his friends fear for his personal safety, and on Jan. 10 he left Whitehall for Hampton court. The next week the accused members were brought back with the enthusiasm of a popular triumph, and the rupture between the king and his parliament seemed complete. Parliament passed a militia act, which amounted to an army act, and Charles sent his queen to Holland Feb. 16, 1642, with the crown jewels, to raise troops against the parliament. On April 23 the king virtually began the war by trying to force an entrance into the city of Hull. The military governor, Hotham, kept him out, and was approved by parliament. The royalist members of parliament vacated their seats, and repaired to the king. The rest no longer tried to pass acts for the king's approval, but passed "ordinances." On May 5 was passed an ordinance calling out the militia. Charles proclaimed this ordinance illegal and summoned the gentlemen of York to form his body guard. He made an address to an assembly of gentlemen in the town hall, which was received with applause; but the attempt to form a body guard was a failure. Another great meeting, 40,000 strong, was held on the moor without the town, where a petition was presented to the king asking him to be reconciled to his parliament, which he received with undisguised displeasure. Parliament now prepared for war. They proposed terms to the king which they knew he would refuse. On July 12 they voted to raise an army. On Aug. 22, Prince Rupert having joined the king, the royal standard was set up upon Nottingham castle. On Sept. 9 parliament published a declaration of the causes of the war; and on the 19th the king issued his "protestation," promising to respect the freedom of parliament, and declaring his purposes. Unhappily his private letters to the queen show that his professions were insincere. On Oct. 23 was fought the first battle at Edgehill, with alternating success, and without decided advantage to either side. Essex, the commander of the parliamentarians, was the first to withdraw on the following morning, unpursued by the enemy. On Feb. 22, 1643, the queen landed with an army. Prince Rupert carried many small places through the spring and summer. Hampden was shot in a skirmish. Bristol surrendered to Rupert, July 25, and the parliamentary cause seemed weak and discouraged. Had the royalists now been united and prompt, they might have triumphed and utterly overthrown the popular party. They feared, however, to trust the king, and the battle of Newbury, Sept. 20, was a stubborn fight, and took away all hope of a speedy peace. The remodelling of the parliamentary army followed. Cromwell and Fairfax became its generals; and a discipline was introduced by the former as perfect as that of

any modern service, and a spirit of religious enthusiasm which equalled or surpassed the enthusiastic loyalty and chivalry of the cavaliers. The new discipline proved its power in the battles which followed. An important battle was fought at Marston moor, July 2, 1644; and at Naseby, June 14, 1645, the royal cause was totally overthrown, and the royal army dissipated. After some attempts at negotiation, marked by his usual insincerity and chicane, with the leaders of the parliament and of the army, neither of whom he chose to trust, while neither dared to trust him, Charles delivered himself up to the Scots, May 5, 1646, who, on Jan. 30, 1647, gave him up to the commissioners of the English parliament. Cromwell, who as yet entertained no definite views, was prepared to play the part subsequently played by Monk; and Fairfax, who was averse to all extreme courses, was ready to support him. Yet, even now, when terms were offered him by the Independents so advantageous that Sir John Berkeley, one of his trustiest adherents, declared that "a crown so near lost was never yet so easily recovered as this would be, were things adjusted on these terms," the king refused to concede anything, broke off all terms with the army, commenced new negotiations with the Presbyterians, and ultimately convinced all parties that there was no truth in him. The discovery of a fatal letter to his wife, in which he assured her that he designed for those rogues, Ireton and Cromwell, no reward but that "for a silken garter they should be fitted with a hempen rope," destroyed him. From that moment the chiefs of the army saw that the question lay between their own lives and his life, and they of course decided that it should not be their own, if they could help it. Having been taken on June 4 by Cornet Joyce out of the hands of the commissioners and brought to the army, then lying at Triplo w heath, and now in open rebellion against the parliament, he was taken on Aug. 16 to Hampton court, from which he escaped on Nov. 11, eventually seeking refuge with Hammond, the parliamentary governor of the Isle of Wight. Here he was imprisoned in Carisbrooke castle till Nov. 30, 1648, when, by an order of the council of officers in the army, he was removed to Hurst castle, on the opposite coast of Hampshire. The now dominant army promptly suppressed all risings in his favor. A force in the Presbyterian interest, under the duke of Hamilton, was routed by Cromwell at Langdale, near Preston, Aug. 17. On Dec. 6 the house of commons was invaded by Col. Pride, with a strong detachment of soldiers, and all members ejected except about 150, who were in the Independent interest. On Dec. 22 Charles was brought in custody to Windsor, and on Jan. 15, 1649, to St. James's. On Jan. 20 he was brought to trial in Westminster hall, before a high court of justice specially organized for the purpose. Sentence of death was passed upon him, Jan. 27, and he

was executed by decapitation on a scaffold erected in front of the banqueting house at Whitehall.—Charles I. had eight children by Queen Henrietta, six of whom survived him, viz.: Charles and James, afterward kings of England; Henry, duke of Gloucester; Mary, the wife of William, prince of Orange, and the mother of William III. king of England; Elizabeth, born in 1635, who died a prisoner in Carisbrooke castle Sept. 8, 1650; and Henrietta Anna, the wife of Philip, duke of Orleans, from whom, through a daughter, is descended the royal family of Italy. Charles was an elegant writer of English, and in the early part of his reign a zealous patron of the fine arts. The writings attributed to him are indicated in Horace Walpole's "Royal and Noble Authors," and have been published under the title of *Reliquiæ Sacre Carolinæ*. Among them is the famous work, the *Eikon Basilike*, or "Portraiture of his Sacred Majesty in his Solitudes and Sufferings;" his claim to its authorship, however, has been much disputed.

CHARLES II., second son of the preceding (the first son, Charles James, having died on the day of his birth, March 18, 1629), born May 29, 1630, died Feb. 6, 1685. At 12 years of age he was appointed by his father commander of the troop of horse which he raised as a body guard at York, and three years afterward he was sent to serve with the royal troops in the west with the rank of general. After the battle of Naseby (1645) the prince retired to Scilly, and subsequently to Jersey, where he remained till September, 1646, when he joined his mother in Paris. In 1649, while residing at the Hague, he received the news of the execution of his father, and immediately assumed the title of king, and was proclaimed king in Edinburgh Feb. 3, 1649, but with little prospect of ascending the throne. Having left Holland to spend some time in Paris, he subsequently repaired to Jersey, whence he arrived in the north of Scotland June 23, 1650, after having agreed to the conditions imposed by the Presbyterians, and after having been forced to take the covenant before landing. Proclaimed king of Scotland at Edinburgh, July 15, 1650, he was crowned at Seone, Jan. 1, 1651. Cromwell, however, having already conquered the greater part of Scotland, Charles resolved on marching to the south, entered England Aug. 6, and took possession of the city of Carlisle, where he was again proclaimed king. The battle of Worcester (Sept. 3), however, in which he was defeated by Cromwell, put an end to this enterprise. After many narrow escapes from capture, he succeeded in embarking at Shoreham, Sussex, Oct. 15, and went to Normandy, and thence to Paris. The peace of 1655 forcing him to leave France, he went to Bruges and remained there and in Brussels until the news of Cromwell's death in 1658 reached him. In order to be able to avail himself of the confusion which arose in Eng-

land after the downfall of Richard Cromwell's government, Charles stationed himself at Calais in August, 1659; but it was not till April, 1660, that he succeeded during his stay at Breda in opening a negotiation with Gen. Monk. Having transmitted to parliament a document called the declaration of Breda, containing specific pledges as to his future conduct and principles of government, his restoration to the throne of England was voted on May 1, and on May 8 he was proclaimed king in London, which city he entered May 29, having departed from the Hague six days before. His journey to London was one continued triumph; and the whole of the country through which it passed bore the aspect of a universal fair day. So great was the rapture of loyalty with which Charles was received, that, with his usual wit, he observed to some one of his company that he could not see for the life of him why he had stayed away so long, when everybody seemed so charmed that he was at length come back. He was received with open arms, and reinstated without being asked to give a guarantee or to make a concession. In the general joy at the restoration, many acts were popular, or not unpopular, which at another time would have caused great indignation. There was little general excitement when the Presbyterian ministers were ejected from their livings in August, 1662. The first really unpopular acts of the king were his declaration of indulgence to Catholics, and the surrender of Dunkirk, toward the close of 1662. This fortress, won by the valor of the Cromwellian soldiery, which was regarded as a compensation for the loss of Calais, was ignominiously sold to the French. The declaration of Breda had left the question of church lands which had been sold during the protectorate to be settled by parliament; but by the management of Clarendon parliament adjourned without settling it, and the result was the vitiating of all such sales and the entire restoration of the lands, the buyers having no redress in the courts. The king had made the most general promises of pardon and amnesty, and even the regicide judges were invited to trust to his honorable clemency; but with the concurrence of parliament, and in truth by act of parliament, they were excepted from the indemnity, even those who surrendered themselves, and all but a few who escaped were either imprisoned for life, or hanged, drawn, and quartered. By vote of the commons, the bodies of Cromwell, Bradshaw, and Ireton were disinterred, and hanged upon the gibbet at Tyburn. The duke of Argyll was executed in Scotland, and Sir Henry Vane in England; and the excessive zeal for episcopacy of Clarendon and the rough cruelty of Claverhouse made this a reign of bitter religious persecution. The more moderate Presbyterians, led by Baxter, were persuaded at first that the king would be friendly to them, but were bitterly undeceived. On May 20, 1662, Charles was married to Catharine of

Braganza, daughter of John IV. of Portugal, a virtuous and amiable princess; but he soon outraged her by presenting to her his avowed mistress. The poor queen fainted and the blood gushed from her nose, but Clarendon at length persuaded her to submit to the insult, and her spirit was utterly broken. The unblushing licentiousness of the court was a scandal to the world, even in that day of reaction against Puritan severity. Its excessive extravagance so far exceeded even the liberal grants made by parliament for the royal expenses, that there was general wonder and inquiry where the money was obtained; and in 1664 there was so much gossip in the London coffee houses about money from France, that some of these were closed by order of the government as places of treasonable talk. War broke out with Holland in February, 1665, followed by rupture with France; while parliament continued to legislate against religious nonconformists. In the summer of this year London was desolated with the plague; and in September, 1666, a terrible conflagration completed the work of destruction. The war with the Dutch brought little glory, and in 1667 their ships broke into the Medway and blockaded the Thames. On July 31 a treaty of peace was concluded at Breda. This was followed by the dismissal of Clarendon, through the intrigues, it is believed, of the king's mistress. He was followed after a short interval by the ministry known as the Cabal. In January, 1668, Sir William Temple effected the triple alliance between England, Holland, and Sweden. The king announced this to parliament, and it gave great satisfaction to the nation, being in truth the best public act since the restoration. Unhappily, at this very time, he was negotiating a clandestine treaty with Louis XIV., which was to make England wholly subservient to the French king; and when Sir William came home in the autumn of 1670, he was coldly received by the ministers and king, and retired from public life. To supply money to the king and ministry, the exchequer was closed, and the regular payments of over a million pounds then due were suspended by proclamation for a year. A financial panic and great distress ensued. It was decided to capture a fleet of Dutch ships, but the Dutch convoy beat off the English admiral. On March 17, 1672, war was declared against Holland, and a declaration from France was issued at the same time. The pretenses for war were trifling. The first important battle, in Southwold bay, May 28, gave little advantage to either side. The French meantime were victorious on land. But the young prince of Orange proved the deliverer of his country. The war dragged on for two years, when a separate peace was made between England and Holland, the war on the part of France still continuing. Meantime Charles made a declaration of indulgence in religion, suspending all penal laws in religious matters, in consequence of which many prison-

ers were released; among others John Bunyan, who had been in jail 12 years. This declaration, however, was extremely unpopular. Parliament on Oct. 20, 1673, petitioned against the proposed marriage of the duke of York with the princess of Modena, but Charles replied that the alliance was already completed. Parliament was disposed to remonstrate against the alliance with France, and against the king's evil counsellors. For the next seven years the king and parliament were in a continual contest, the court being utterly corrupt and parliament exceedingly factious. The subserviency of Charles to Louis XIV. was most shameful. The long prorogation of parliament in November, 1675, was an arrangement with the French king, for which Charles received 500,000 crowns. The two kings agreed to make no treaties not mutually acceptable, and Charles accepted a pension, upon his pledge to prorogue or dissolve any parliament which should attempt to force such treaties upon him. Prince William of Orange came to England in 1677, and was married, Nov. 4, to the princess Mary, daughter of the duke of York. This gave offence to Louis, and he stopped Charles's pension. There was great public discontent at the conversion of the duke of York to the Roman Catholic faith, and his marriage to a Catholic princess, and the whole nation was excited over the supposed discovery of a popish plot to assassinate the king. The investigation of this plot dragged along for years, and resulted in the imprisonment and death of many eminent persons; but nothing of importance was discovered, and it was common for each political party to charge its opponents with the invention of the plot. While this excitement was still high, the secret treaty with Louis XIV. was revealed, and parliament impeached the lord treasurer Danby, who suffered for the crimes of which he was only an accomplice. Charles interrupted these proceedings by proroguing parliament, Dec. 21, 1678, and dissolving it, Jan. 24, 1679. The new parliament met March 6, and did one noble deed in passing the habeas corpus act, which Charles signed May 26. A bill for the exclusion of the duke of York from the succession to the throne passed a second reading in the commons, when parliament was prorogued on May 26 to Aug. 14, and before its reassembling dissolved. On Nov. 15 the next house of commons passed the bill, but it was rejected by the house of lords. In 1683 the discovery of the Rye House plot led to the arrest of a number of eminent whig leaders upon suspicion of complicity. There seems to have been a real plot among some obscure persons, but the complicity of these leaders was not believed even by the royalists of the time; yet Lord William Russell was beheaded July 21, Algernon Sidney Dec. 7, and Sir Thomas Armstrong June 20, 1684. The duke of York was now closely associated with the king, and openly succeeded to the chief administration of public affairs.

He had consented to the marriage of his daughter Anne with the Protestant Prince George of Denmark, and was restored to his offices of high admiral and privy councillor. Arbitrary government was unchecked in England, while abroad the nation counted for nothing. Even some of Charles's advisers felt the national degradation. Halifax suggested the calling of a parliament, and opposed the French alliance. The duke of York opposed him. While this discussion was unsettled, the king was struck with apoplexy. When it was plain that he was dying, the duchess of Portsmouth told Barillon, the French ambassador, that Charles was really a Roman Catholic, and was dying outside the pale of his church. Barillon told the duke of York, and James, conferring with his brother, at his desire brought him a priest, and Charles confessed and received extreme unction.—Charles had good natural abilities and an amiable temperament. His early education and misfortunes quickened his wit, but left him careless of duty, incapable of self-denial, and skeptical of all virtue. He knew the worthlessness of his favorites, but was their slave, though not their dupe. He was lavish of money, but not generously so, giving to those who pressed him hardest. His political course was not from motives of principle and conviction, as his father's had been, but he wished to be a king after the French fashion, unhampered by lack of money or constitutional obstacles in the pursuit of his personal wishes. He was devoid of revenge as well as of gratitude, and treated friends and enemies with the same indolent selfishness. His affability, however, made him to some extent popular, in spite of his gross defects of character and disgraceful misgovernment.—Charles had no children by his queen. Among his natural children were: 1, James, duke of Monmouth, by Mrs. Lucy Walters, born at Rotterdam in 1649, ancestor of the dukes of Buccleugh; 2, Mary, also by Mrs. Walters; 3, Charlotte Jemima Henrietta Maria Boyle (alias Fitzroy), by Elizabeth Viscountess Shannon; 4, Charles, surnamed Fitz-Charles, by Mrs. Catharine Peg; 5, a daughter by Mrs. Peg, who died in infancy; 6, Charles Fitzroy, duke of Southampton, by the duchess of Cleveland; 7, Henry Fitzroy, duke of Grafton, by the same, ancestor of the dukes of Grafton; 8, George Fitzroy, duke of Northumberland, by the same; 9, Charlotte Fitzroy, by the same; 10, Charles Beauclerc, duke of St. Albans, by the famous Nell Gwynn, ancestor of the dukes of St. Albans; 11, Charles Lenox, duke of Richmond, by Louise Quérouaille, a French woman, created duchess of Portsmouth, ancestor of the dukes of Richmond; and 12, Mary Tudor, by Mrs. Mary Davis.—See Bishop Burnett's "History of His Own Time;" Evelyn's "Diary and Correspondence;" Samuel Pepys's "Diary and Correspondence;" Gramont's "Mémoires," by Hamilton; and Jesse's "Court of the Stuarts."

II. FRANCE.

CHARLES MARTEL, duke of Austrasia and mayor of the palace of the Frankish kings, born about 690, died in 741. He was the natural son of Pepin of Héristal, by his mistress Alpaïda, and seemed at first doomed to an inferior rank on account of his illegitimate birth, as well as the dislike shown to him by his father and the hatred of Plectruda, his father's lawful wife. The second son of the latter, Grimoald, having been assassinated at Liège, Charles was charged with being the murderer and consequently thrown into a dungeon, while Plectruda was intrusted with the government and the guardianship of her grandson, who, although still a child, had been declared mayor of the palace of the young king Dagobert III. The Franks were thus ruled by a woman in the name of two children. This could not be endured; and the Neustrians first rebelled against Plectruda, and the Austrasians liberated Charles from prison, and proclaimed him their duke. Under his command they invaded Neustria, gained several victories, and obliged their western brothers to acknowledge the authority of their leader. Thus Charles became sole lord of both kingdoms, permitting however the nominal reign of Dagobert III., Chilperic II., Clotaire IV., and Thierry IV. to continue to 737. But on the death of the last named Charles appointed no successor and retained the supreme power, although not assuming any higher title than that of duke of the Franks. His energetic government at home caused the powerful Austrasian aristocracy to submit, as well as the prelates of Neustria and Burgundy, while his valor enlarged the extent of the Frankish kingdom. He waged successful wars against several German nations; but his brightest laurel was won in his struggle with the Moslems, who after the conquest of Spain had crossed the Pyrenees and attempted to conquer Gaul also. The southern part of this country had been first successfully protected by the gallant Eudes, duke of Aquitania, who had even routed the Moslems in 721 in a great battle under the walls of Toulouse; but, overpowered by the immense forces of the invaders, he was eventually compelled to call upon the duke of the Franks for assistance. The Moslems had already penetrated as far as Poitiers, when Charles at the head of his Frankish and German warriors met them a few miles N. E. of that city. Both armies stopped and passed six days in desultory skirmishes before engaging in a decisive battle. At last, on Oct. 3, 732, the Christian infantry received the charge of the Arabian cavalry, and withstood unbroken its repeated assaults, until at sunset the Saracens retired to their camp. In the confusion and despair of the night the various tribes of the Orient, Africa, and Spain were provoked to attack each other, and the remains of the host were suddenly dissolved, every emir seeking safety by a precipitate

flight. At sunrise the Franks, to their unbounded astonishment, perceived that the enemy had left their camp and were retreating in haste toward the south. The Moslems had not dared to renew the battle. This victory, which took place 100 years after the death of Mohammed, checked the power of his adherents and saved western Europe from their further invasions. Charles, from his conduct on this great occasion and the vigor of his arm, received the surname of Martel, "hammer." His prudence prevented him from pursuing the retreating army; but he subsequently renewed the war, and forced the Arabian emirs who had maintained their power over several cities of southern Gaul to return to Spain. The whole of Aquitania was annexed to the Frankish empire, which was ruled by Charles, and after his death divided between his two sons, Austrasia being given to Carloman and Neustria to Pepin. The latter soon became possessed of the whole, and afterward assumed the title of king, the first of the Carolingian dynasty.

CHARLES I. (CHARLEMAGNE). See **CHARLES I. OF GERMANY.**

CHARLES II., the Bald, the fourth king of the Carolingian dynasty, born at Frankfort-on-the-Main in 823, died in a village at the foot of Mont Cenis in October, 877. The son of Louis le Débonnaire by his second wife, Judith of Bavaria, his birth gave rise to serious troubles between his father and his elder brothers. War followed, in which the old Louis le Débonnaire was harshly dealt with by his sons; and his death, June 20, 840, found Charles holding nearly the whole western part of the empire. His claim being, however, disputed by his eldest brother Lothaire, who had assumed the imperial dignity, Charles, to maintain his rights, formed with his second brother Louis, king of Bavaria, an aggressive alliance against the emperor, and defeated him in a desperate battle fought June 25, 841, at Fontenay or Fontanet, in Burgundy. The victory, however, weakened their resources to such an extent as to prevent them from following it up. Charles and Louis renewed their alliance in a solemn meeting at Strasburg, Charles taking an oath in the German language, and Louis in the vernacular of the people of Gaul. The words of this oath, which have been preserved, are the first monument of the Romance language, from which the French has sprung. The union of Charles and Louis brought Lothaire to terms; and the treaty of Verdun in 843 secured to the former the tenure of his kingdom, that is, the whole of Gaul W. of the Meuse, the Saône, and the Rhône, which henceforth was to be called France, and part of Spain N. of the Ebro. But the submission of all the provinces of this kingdom was far from being complete, and Charles had frequently to resort to arms against the people of Brittany and Aquitaine. Under his reign the Normans, who had previously desolated the coasts of Gaul, invaded the country by ascending the

rivers, burning and plundering the villages and the cities. Paris itself had to suffer by their ravages, Charles being unable to afford protection against them. On the death of his nephew, the emperor Louis II., in 875, Charles seized upon the imperial crown; but his power seems to have been rather diminished by this assumption of a new title. A few months later he was compelled to sign a decree by which the tenure of the counties was declared hereditary, which decree was the foundation of the feudal system in France. This was the last important act of his otherwise inglorious reign.

CHARLES THE FAT. See **CHARLES THE FAT**, Germany.

CHARLES III., the Simple, the eighth king of the Carolingian dynasty, born Sept. 17, 879, died at Péronne, Oct. 7, 929. A posthumous son of Louis the Stammerer, he was excluded from the throne first by his brothers, then by Charles the Fat of Germany, and finally by the election of Eudes. As soon, however, as he became of age, he asserted his claim to the crown, sought for the protection of the Carolingian princes of Germany, and was in 898 recognized as king by the majority of the French nation. Being unable to resist the incessant aggressions of the Normans, he concluded a treaty with their chief Rollo, at St. Clair-sur-Epte, in 911, by which he bestowed upon him as a duchy the whole N. W. part of Neustria, also giving him his sister in marriage. For a few years France enjoyed comparative quiet, but in 922 the barons revolted against the narrow-minded Charles, and elected as king Robert, the brother of Eudes. Charles defeated his rival, and killed him with his own hand; but he was in his turn defeated by the son of Robert, Hugh the Great, count of Paris; and having sought a refuge with Herbert, count of Vermandois, he was detained by him as prisoner until his death. The party which opposed the Carolingians then reigned paramount, and it was not till 936 that Louis IV. d'Outremer, the son of Charles, became king.

CHARLES IV., the Fair, the last king of the direct line of the Capetian dynasty, born in 1294, died at Vincennes, Jan. 31, 1328. The third son of Philip IV., the Fair, he succeeded his brother Philip V., the Tall, in 1322, and visited with severe punishment the Lombard money-changers for their many extortions, the judges for their prevarications, and the barons for their unlawful encroachments upon private property. He secretly aided his sister Isabella in her revolt against her husband, Edward II. of England, made a futile attempt to be elected emperor of Germany, and died leaving his third wife, Jeanne d'Évreux, pregnant. On her being delivered of a daughter, the crown went to Philip of Valois, the cousin of Charles, and the grandson of Philip III., the Bold. The Capetian direct line ended by three brothers succeeding each other: Louis X., Philip V., and Charles IV.; so did the collateral branches of Valois and Bourbon.

CHARLES V., the Wise, the third king of the family of Valois, son of John II., born Jan. 21, 1337, died at Vincennes, Sept. 16, 1380. He was a prince of very little military genius, but with much taste for learning. Being in command of a body of the French army at the battle of Poitiers, he deserted the field at an early period, while his father and younger brother fought bravely. On the captivity of the former (1356), he was appointed his lieutenant, and had to contend against a formidable popular rebellion, headed by Stephen Marcel, provost of the merchants of Paris, and Robert Le-coeq, bishop of Laon. At length, after having succeeded in getting rid of the principal leader, who was murdered by one of his adherents, he assumed the title of regent, and concluded in 1360, with the English, the treaty of Brétigny for the liberation of the king. By this treaty, Edward III. was to remain in independent possession of all the provinces of the Loire, comprised under the general name of Aquitaine, with Ponthieu and the country around Calais; but he was to renounce his claims to the crown of France, as well as those to Normandy, Touraine, Anjou, Maine, Brittany, and Flanders; the ransom of John was fixed at 3,000,000 gold crowns, while two of his sons and several great lords of the kingdom were to be given as hostages. John was liberated; but the terms of his liberation not having been complied with, he returned to England, leaving for the second time the regency in the hands of Charles, who succeeded him on his death in 1364. Charles was now at full liberty to display the shrewdness of his policy, and soon worsted Edward III., who had defeated both his father and grandfather. Being greatly assisted by the valor and prudence of his great constable Du Guesclin, he destroyed several armies of the English, and wrested from them the French provinces which they had held for years. On the death of Edward, the only places still left in their hands were Bordeaux, Bayonne, Cherbourg, Calais, and a few other fortresses. By timely assistance to Henry of Trastamare against Pedro the Cruel, king of Castile, Charles had secured for himself an ally who was of great service in his naval contests, and consequently instrumental in his final success over England. Meanwhile, tranquillity, order, and prosperity had been restored to France; and several important learned institutions were founded, among the number the king's library, now the great national library in Paris. In his reign the Bastille was also erected, mainly with a view to hold the Parisians in submission. Charles V. was, if not one of the greatest, at least one of the most useful of French kings.

CHARLES VI., the Mad, or the Beloved, the fourth king of the family of Valois, born in Paris, Dec. 3, 1368, died Oct. 21, 1422. The son of Charles the Wise, he was but 11 years old when his father died; and his uncles, the dukes of Anjou, Berry, Burgundy, and Bour-

bon, undertook to reign in his name. A general rebellion broke out against their oppressive administration, especially in Paris, where the insurgents were called *Maillotins*, from the mallets with which they were armed. Charles was taken by the duke of Burgundy to Flanders, and won, Nov. 27, 1382, the battle of Roosebeke. This success resulted in the temporary submission of the great cities of France. The king's uncles availed themselves of this opportunity to levy new taxes upon the people, but Charles dismissed them in 1388, declaring that he intended to govern for himself; and for several years, at least, France enjoyed under his rule a wise and mild administration, which secured for the young king a popular affection which even subsequent misfortunes failed to obliterate. In 1392 Charles, while marching against the duke of Brittany, was violently frightened by the sudden appearance of a ragged maniac, who stopped his horse and cried: "Do not proceed further, noble king; you are betrayed." This overpowered his already weak mind, and he fell into a state of derangement, which was the next year aggravated by his running the risk of being burned alive at a masquerade ball. Henceforth he was disabled from attending to the duties of his position; and his uncles again seized the reins of government, the duke of Burgundy managing to secure his own ascendancy. The king's brother, Duke Louis of Orleans, soon attempted to snatch the power from his hands, and two opposite parties, Orleanists and Burgundians, arose to divide the court and the nation. The contest grew fiercer when John the Fearless of Burgundy succeeded his father, Philip the Bold, and his hatred toward his cousin of Orleans could only be gratified by causing the latter to be murdered, Nov. 23, 1407. The count of Armagnac, the leader of a formidable soldiery from the south of France, at once espoused the cause of Orleans, and henceforth this faction was called by the name of Armagnacs. Civil war commenced between these and the Burgundians, and the unfortunate king was entirely neglected and left to the care of menials; while his wife, Isabella of Bavaria, whom he had married in July, 1385, gave herself up to amours and political intrigues. The daughter of a horse dealer, Odette de Champdivers, sometimes styled the little queen from having been his mistress, was almost the only one who brought any consolation to the king's distracted mind. During his lucid intervals he had sense enough to sympathize with the misfortunes of France. The condition of the country was becoming worse every day, when a new enemy appeared in the person of Henry V. of England, who, landing on the coast of Normandy, gained a victory over the French at Agincourt, Oct. 25, 1415, as complete as those of Crécy and Poitiers. France was everywhere given up to pillage, murder, fighting, and bloodshed. At the end of four years there seemed to be a lull, and negotiations were entered into;

but the treacherous murder of John the Fearless, perpetrated in the presence of the dauphin Charles, Sept. 10, 1419, gave a new impetus to the civil war. Philip the Good, son of John the Fearless, eager to avenge his father's death, concluded a treaty at Troyes May 21, 1420, with the treacherous wife of Charles and Henry V. of England, in virtue of which the latter received the hand of the king's daughter Catharine, with the regency of France for the present and the assurance of succeeding to the throne after the king's death. In all these transactions the unfortunate prince had of course nothing to do, except to sanction them by his presence or signature. Henry V. did not long enjoy his prospect of grandeur, dying Aug. 31, 1422. Charles himself died shortly afterward, leaving most of France in English hands.

CHARLES VII., the Victorious, the fifth king of the house of Valois, born in Paris, Feb. 22, 1403, died at the castle of Mehun-sur-Yèvre, near Bourges, July 22, 1461. The fifth son of Charles VI. and Isabella, he became by the early death of his brothers heir apparent to the crown in 1416. In 1417 he was appointed lieutenant of the kingdom, and shortly afterward he assumed the title of regent, without however being able, on account of his indolent habits, to exert any authority; he was but a tool in the hands of his favorites, most of them leaders of the Armagnac faction. On the death of Henry V. and Charles VI. in 1422, Henry VI. of England was proclaimed king of France at St. Denis, and his authority recognized by the majority of the people, while Charles was supported only by a few citizens of central and southern France. He was so poor and powerless that his enemies called him the *roi de Bourges*, as if this city were the whole of his monarchy. The duke of Bedford, who governed in the name of Henry VI., successfully waged war against Charles, and the English troops, victorious in several encounters, concentrated themselves around Orleans, which was the stronghold of the French king. His position was utterly helpless, when suddenly a young peasant girl, Joan of Arc, the celebrated "maid of Orleans," came to his rescue. Her enthusiasm, patriotic devotion, and confidence in victory inspired the French troops with new ardor, while terror spread among the English. Orleans was delivered, the enemy repeatedly defeated, and the king triumphantly brought to Rheims, where he received the holy unction. From this time Charles was indeed the real king in the eyes of the whole people, who everywhere rose in his behalf. The war became a national one, in which the lower classes, who had until then remained nearly indifferent, took an active part. The capture and death of Joan of Arc, far from damping the popular enthusiasm, kindled a new spirit. The French gained considerable advantages; and finally the treaty of Arras, concluded in 1435, between the king and Philip of Burgundy, insured their ultimate triumph. Henceforth Charles appeared to be

a new man; he distinguished himself by wisdom, prudence, and bravery; he achieved the task which had been commenced by others, and partly deserved the glorious appellation which has been attached to his name. Peace was reestablished, order and tranquillity prevailed, and prosperity revived throughout the kingdom. A regular army was organized from 1439 to 1448; the finance department, the administration of justice, and the other branches of the government were put on a better footing. In many of his reforms Charles was assisted by Jacques Cœur, the richest and most enterprising merchant of the time, whom he had made minister of finance. The improved condition of the country secured the sympathies and, on the renewal of hostilities, the assistance even of those provinces which were still held by the English. Consequently, in the space of a few months, the foreigners were expelled from Normandy and Guienne; and in 1453 the whole of France had returned to its native king, except Calais, which alone remained for another century in the hands of the English. In this great work Charles VII. had been powerfully assisted by the popular feeling, the prominent representatives of which were Joan of Arc, the heroine, and Jacques Cœur, the merchant; to both he proved ungrateful, leaving the former at the mercy of the English, without the slightest attempt at her liberation, and proscribing the latter, to whose financial assistance he was especially indebted. The celebrated pragmatic sanction, which secured the freedom and privileges of the Gallican church against the encroachments of the Roman see, was negotiated by him in 1438. His later years were embittered by the intrigues and rebellions of the dauphin, the future Louis XI.; his fear of being poisoned by his son became so overwhelming, that he finally refused to take any food, and died of starvation.

CHARLES VIII., the seventh king of the house of Valois, born at Amboise, June 30, 1470, died April 7, 1498. Being only 13 years of age on the death of his father, Louis XI., his eldest sister, Anne de Beaujeu, seized the reins of government, overpowered Louis of Orleans and his associates, who attempted to resist her, and ruled France in peace and prosperity till her brother became of age. The chivalric romances and accounts of Charlemagne's heroic deeds had imbued his weak mind with the idea that it was his mission to restore the Roman empire, and to take Constantinople from the Turks. At the head of a powerful army he entered Italy in 1494, triumphantly marched through the peninsula, and took possession of Naples. Satisfied with his military exploits, he left a part of his army in Naples, and hurried home with a select body of about 9,000 soldiers. When in the neighborhood of Parma, he encountered at Fornovo an army of 40,000 Italians, whom he routed (July 6, 1495), and triumphantly reentered France. He soon learned that his army had been defeated by

the Spaniards under Gonzalvo de Cordova, and that the kingdom of Naples had returned to its old allegiance (1496). He was planning a new expedition when he suddenly expired from the effects of an apparently trifling accident.

CHARLES IX., the twelfth king of the family of Valois, born at St. Germain-en-Laye, June 27, 1550, died May 30, 1574. The second son of Henry II. and Catharine de' Medici, he succeeded his brother, Francis II., Dec. 5, 1560, when only 10 years old, under the regency of his mother. The hatred between the Catholics and the Protestants had been growing for years past; an attempt at conciliation through the conference of Poissy having proved a failure, hostilities soon broke out. The Protestants resorted to arms, headed by the prince of Condé. After being successful in the first encounters, they were defeated at Dreux in 1562 by the duke of Guise, who was assassinated a few months later while besieging Orleans. A treaty of peace, known as the edict of Amboise, was concluded March 19, 1563, between the regent and the leaders of the insurgents. The war was renewed in 1567, when the Protestants were again defeated at St. Denis by Montmorency. A new peace intervened, which was of very short duration, the enemies being again in the field toward the middle of 1568. This third war was signalized by the battles of Jarnac (March 13, 1569) and Moncontour (Oct. 3), won by Henry, duke of Anjou, the younger brother of the king; then peace, now believed to be final, returned again. The king himself, Queen Catharine de' Medici, and the whole court, seemed to be reconciled to the Protestant party; Coligni was received with great honor by his young sovereign, who fondly called him "father," and required his advice in the administration of the government; the king of Navarre, afterward Henry IV., married the king's sister, Margaret; the other Protestant chiefs were welcomed at the court. Charles IX., above all, tried to foster concord and friendship between the recent enemies, so that those uninitiated in the secret councils of the court were assured that all were safe, when suddenly it was reported that Admiral Coligni had been shot by a man commonly known as the king's assassin. This was an awful warning, but it was too late for the Protestants to take measures for their security; they were unarmed and defenceless. About daybreak on Aug. 24, St. Bartholomew's day, 1572, at a signal given from the Louvre, the Catholics of Paris rose in arms and mercilessly slaughtered their opponents, who had confided in the word of the king. It is difficult to determine what was the part of Charles IX. in the fatal deed. He seems to have acted under the pernicious influence of Catharine de' Medici. This terrible woman drew from him the frantic exclamation, which was construed as an order: "Well, then, kill them all, that not a single Huguenot may live to reproach me with their death!" He frequently afterward manifested signs of deep

remorse, and breathed his last when only 24 years of age, amid dreadful corporal and spiritual sufferings.

CHARLES X., the seventh and last king of the family of Bourbon, born at Versailles, Oct. 9, 1757, died at Görz, in Austria, Nov. 6, 1836. He was the fourth son of the dauphin, son of Louis XV., and received at his birth the names of Charles Philip, and the title of count of Artois. After being very indifferently educated under the superintendence of the duke de la Vauguyon, he married, Nov. 16, 1773, Maria Theresa of Savoy, a younger sister of the countess of Provence, by whom he had two sons, the dukes of Angoulême and Berry. Being of a very profligate disposition, he neglected his wife, both for ladies at the court and common courtesans. Among the latter was Mlle. Duthé, who enjoyed an unenviable celebrity. His scandalous conduct was, however, somewhat restricted by the influence of the dauphiness Marie Antoinette, and his love for Mme. de Polastron. On one occasion he rashly insulted his cousin, the duchess of Bourbon, at the opera ball; and his duel with the duke which grew out of this circumstance seriously impaired the favor which his affable and courteous manners had gained for him. He tried to make amends by distinguishing himself at the siege of Gibraltar, but in vain; his levity and inconsistency had destroyed the last vestige of his popularity. When the revolution broke out he became one of its most uncompromising enemies. But instead of supporting his unhappy brother, Louis XVI., he fled from Paris to Brussels, then to Turin, where he engaged in intrigues, the consequence of which was to increase the danger to which his brother was exposed. On May 20, 1791, he had an interview with the emperor Leopold at Mantua, and a few months later was present at the conference of Pilnitz, the only result of which was to give a new impetus to the revolutionary spirit in France. While he was going about begging assistance for the royalist cause, the king was arraigned before the convention, sentenced to death, and executed. The exiled prince, who now assumed the title of Monsieur, repaired to Russia, where Catharine II. presented him with a magnificently ornamented sword bearing this inscription: "*Donnée par Dieu pour le Roi.*" But this was a useless weapon in such weak hands. The ill-directed efforts of the Bourbons and their allies having proved fruitless on the Rhine, it was thought proper to give encouragement and assistance to the Vendéans or Chouans. Monsieur was consequently sent, in August, 1795, with English ships, to effect a landing on the coast of Brittany. Although supported by a large number of emigrants and some 2,500 English troops, the brave Charette, who was in waiting for him, having gathered nearly 20,000 Vendéans, and engaged his word that 60,000 more would rise in arms on the arrival of a Bourbon, the prince did not dare to land, and his cowardice was the signal of the ultimate defeat of

the monarchical party in western France. He afterward lived in obscurity, residing mainly in England, till the fall of Napoleon, when he repaired to Paris, and on April 12, 1814, was welcomed there by the provisional government, headed by Talleyrand. A part of the Parisian population hailed his return, while his affability of manners and kind words conciliated the good will of many. The most popular saying reported of him at the time was: "Friends, nothing is changed in France; there is only one Frenchman more." Notwithstanding this favorable beginning, 11 months had hardly elapsed when Monsieur was again compelled to leave France, after having vainly tried to secure the city of Lyons against the approach of Napoleon. The defeat of the emperor at Waterloo brought him back again to France in the train of the allied armies. During the first years of the restoration he kept aloof from public affairs; but he was the head of the ultra-royalist party, which so seriously interfered with the policy of Louis XVIII. That party at last prevailed, after the assassination of the duke de Berry (1820), by the accession of the Villèle cabinet, and the influence of Monsieur became prominent. He succeeded Louis XVIII., Sept. 16, 1824, under very favorable auspices, his brother not having been a favorite with the nation. At first he adopted some popular measures; but soon his government appeared to be ruled solely with a view to the reestablishment of the old régime. A bill to indemnify the emigrants for their losses during the revolution was introduced; this bill, by which the nation was to assume a thousand millions of new debts, in behalf of those who had actually borne arms against it, was adopted in March, 1825. This was a great triumph for the reactionary party. Soon another bill was passed, decreeing the most severe penalty against what was called sacrilege. In the legislative session of 1826 an attempt was made to alter the law of inheritance, so as to reestablish the right of primogeniture; this, however, failed. Another bill, to regulate or rather to destroy the freedom of the press, called *loi de justice et d'amour*, was not more successful. The public discontent was further increased by the favor shown by the government to the Jesuits, who had reestablished themselves in France under the new appellation of *pères de la foi*. At last the popular sentiment broke out during a review of the national guards, held April 29, 1827, by the king himself; he was received by the cries of "Down with the ministers," "Down with Villèle." Greatly provoked by these manifestations, his haughty answer was that he "came to receive homage, not lessons." On the same night a decree of dissolution was issued against the national guards. A few weeks later the chamber of deputies was also dissolved, while the royalist party was reënforced in the chamber of peers by the addition of 76 new members. At the same time the freedom of the press was entire-

ly suppressed by the reëstablishment of the censorship. To divert public attention, the government resolved on assisting Greece in her war of independence, but the glory achieved by French arms failed to restore popularity to the cabinet; and Charles X. at last consented to part with his ministers and choose new counsellors among the most liberal royalists. The Martignac ministry, formed Jan. 4, 1828, was the signal of a kind of reconciliation between the king and the nation. The measures then adopted were hailed with delight by the friends of constitutional liberty, but created the utmost dissatisfaction among the court party. The king, fearing the ascendancy of liberal principles and following the suggestions of the ultra royalists, dismissed the Martignac administration, and intrusted Prince Polignac with the formation of a new cabinet. The prince was the truest representative of that old royalist party which had "forgotten nothing and learned nothing." His mere name was considered as a challenge offered by the king to the nation; every one foresaw the coming struggle. In vain the government tried to assuage public opinion by the excitement of military success. The expedition against Algiers was undertaken; that stronghold of piracy was stormed on July 5, 1830. But all to no purpose; the interest of the whole nation was engrossed by home affairs. On the opening of the chambers, March 2, the king had made use of threatening language, and to this a majority of 221 deputies answered by voting an address declaring their want of confidence in the ministry. The king declined to receive the address, on which the chambers were adjourned, and on May 16 they were dissolved. New elections took place, and resulted in a still more powerful opposition majority. Incensed at this, and encouraged by the triumph of the French army in Algeria, the king resorted to a *coup d'état*. Decrees were promulgated suppressing entirely the freedom of the press, dissolving the newly elected but not yet opened chamber of deputies, and prescribing an essential modification in the mode of election, so as to secure the triumph of the court party. These ordinances fell like a thunderbolt on Paris. Resistance was immediately organized; barricades were built, and defended by bodies of workmen from the suburbs, and by artisans and printers, under the command of officers and young men from the polytechnic school. The insurrection was emphatically popular, and not confined to any particular class. The royal troops, under Marshal Marmont, offered slight resistance, and were driven from the capital in less than three days (July 27-29). Charles X. was so little conscious of the danger of his situation that he remained quietly at the palace of St. Cloud; he learned but gradually the defeat of his troops, being to the last under the impression that he had to deal only with a riot. But it was a revolution, and when he attempted to avoid its consequences it was too late. He recalled the fatal ordi-

nances, appointed a liberal ministry, and even abdicated in favor of his grandson, the duke of Bordeaux, the present count of Chambord, his surviving son, the duke d'Angoulême, equally resigning his rights. But the chiefs of the revolution would not accept such proposals; the king had no alternative but to depart. He retired first to Trianon, then to Rambouillet, under the protection of his guards. In the latter place he made some show of resistance; but on the appearance of 10,000 volunteers from Paris, he gave up entirely, and, accompanied by commissioners sent by the chamber of deputies, he directed his course toward Cherbourg. There, on Aug. 16, he embarked for England with his family and a few faithful servants, on board of two American ships, the Great Britain and the Charles Carroll. He landed at Cowes under the name of count de Ponthieu, and immediately repaired to the palace of Holyrood, in Scotland, which had been assigned to him as a residence by the English government. In this retreat he devoted his time to field sports, of which he was still very fond notwithstanding his old age, and to religious duties. After four years' residence, he left Scotland for Bohemia, where he lived successively at Buschtierad and the Hradschin of Prague. Finally he resolved to retire to Görz, and arrived there in October, 1836, but soon died of the cholera, after a sickness of five days.

III. GERMANY.

CHARLES I., Charlemagne, or Charles the Great (Ger. *Karl der Grosse*), emperor of the West and king of France, born according to some in Aix-la-Chapelle, according to others in the castle of Salzburg, near Neustadt, in the Bavarian district of Lower Franconia, April 2, 742, died in Aix-la-Chapelle, Jan. 28, 814. The second son of Pepin, the Frankish king, dom reverted to him and his brother Carloman on his father's demise in 768. Carloman dying three years later, Charles secured the undivided sovereignty. He now found himself master of the whole of Gaul and western Germany; his ambition, however, was unsatisfied, and a succession of fortunate wars in Italy, Spain, and Germany added largely to his already extensive dominion. His first conquest was that of Lombardy. Motives of discontent and estrangement had for several years existed between him and Desiderius, king of the Lombards. He had before his accession to the throne married Desiderata, the daughter of the latter, and had recently sent her back in a scornful manner to her father. Desiderius himself had granted an asylum to the nephews and some of the bitterest enemies of his son-in-law; at the same time he assumed a hostile attitude toward the popes of Rome, whom Pepin had made firm allies of the Carolingians by bestowing upon them the exarchate of Ravenna. Charlemagne, yielding to his own anger and to the entreaties of Pope

Adrian I., crossed the Alps in 773 at the head of a powerful army, besieged Pavia for eight months, and took possession of it only when its defenders had been disabled by pestilence and famine. Desiderius was exiled to the monastery of Corbie in France, and Charlemagne crowned himself with the ancient iron crown of the Lombard kings; but he had scarcely left Italy when Adelgis, son of Desiderius, supported by the dukes of Spoleto, Friuli, and Benevento, rose in arms against the conqueror. The rebels were crushed at once, and Charlemagne, to make the submission of Lombardy more sure, appointed his second son, Pepin, to reign over the country (776). Meanwhile war was actively prosecuted against the Saxons; the most important, protracted, and terrific of all his wars. Commencing in 772, it terminated only in 804, after a duration of 32 years, with very little interruption. On his first expedition, he took Eresburg, destroyed the venerated statue known as *Irmensul*, and penetrated victoriously as far as the Weser. But the Saxons were far from being conquered. In 775 he invaded their country again, slaughtered all who offered resistance, devastated the towns which were not prompt enough in their submission, and now considered his power firmly established. Far from it; they rose the following year, and, notwithstanding repeated defeats, renewed their resistance in 777, but were again subdued. Charlemagne's power now seemed securely established. He held a *placitum* at Paderborn, where many Saxon tribes acknowledged his authority and were baptized. Wittikind, their intrepid chief, the hero who inspired them with his courage and love of independence, had been obliged to take refuge with a northern prince. Charlemagne improved this interval of apparent tranquillity to make war on Abderrahman, the new caliph of Cordova. Crossing the Pyrenees in 778, he took Pamplona, Saragossa, and the territory as far as the Ebro; but a severe misfortune attended his return to France. The rear guard of his army was overtaken in the narrow passes of Roncesvalles by the Basques, the inveterate enemies of the Franks, and destroyed to the last man; among the valiant chiefs who were slain was Roland, whom history scarcely notices till his later renown in the annals of chivalry. But the presence of Charlemagne was required on the Elbe; the indomitable Saxons had revolted again under Wittikind; they could not endure the foreign yoke, and, above all, they hated Christianity. Charlemagne adopted against them measures of the greatest severity and cruelty; more than 4,000 prisoners were at one time slaughtered; many thousands of the Saxons were transplanted with their families into Frankish countries; part of Saxony was laid waste, and every means resorted to to crush the spirit of its inhabitants. Two great battles, which took place at Detmold in 783, destroyed their last forces, and Wittikind, despairing of the future, surrendered in 785,

swore allegiance to Charlemagne at Attigny-sur-Seine, and was baptized. This, however, was far from being the last of these bloody struggles; the independence of Saxony found other champions, who more obscurely, but not less heroically, undertook their patriotic task. The alternate succession of risings and defeats went on almost uninterruptedly, until Saxony, completely exhausted by repeated losses, and bent down under the despotic organization devised by the conqueror, had no recourse but to give up her national freedom and religion. The diffusion of the gospel was aided by conquest; the bishoprics or missionary stations of Minden, Halberstadt, Verden, Bremen, Münster, Hildesheim, Osnabrück, and Paderborn were the origin of as many cities; and the old Saxon nationality was completely broken down. While this desperate struggle was still at its height, Charlemagne had to baffle the treacherous designs of Tassilo, the Agilolfingian duke of Bavaria, who, although a tributary of the Frankish monarch, held secret intercourse with his enemies, and attempted to unite the Saxons, the Lombards, the Avars, the Slavs, and the Saracens against him. The duke was arrested, arraigned as a traitor before an assembly of lords at Ingelheim in 787, and sentence of death passed upon him, which, however, was commuted to imprisonment in the monastery of Jumièges, near Rouen. Bavaria was now divided into counties under Frankish governors. Charlemagne afterward conquered several of the Slavic tribes along the banks of the Baltic, undertook a war of extermination against the Avars, which lasted from 794 to 796, and put their country under the administration of Frankish counts and bishops. Having thus taken possession of the northeast of Spain, the larger part of Italy, and northern and eastern Germany, he found himself at the close of the 8th century master of an empire bounded N. by the Baltic sea, the Eider, the North sea, and the British channel; W. by the Atlantic ocean; S. by the Ebro, the Mediterranean, the Volturno, and the Adriatic; and E. by the Theiss and the Oder. Margraviates, or military marches, were established for the protection of the land frontiers, while fleets were in readiness on the seashore to oppose the piratical invasions of the Saracens and the Northmen. So extensive a dominion seemed fully to warrant a higher appellation than that of king; and moreover, the ultimate aim of his conquests had been the restoration of the western Roman empire. Having been induced to visit Italy to protect Pope Leo III. against his rebellious clergy, the Frankish king was solemnly and triumphantly crowned by the grateful pontiff in St. Peter's church, on the Christmas day of the 800th year of the Christian era. Henceforth he styled himself emperor of the West, and, with a view of reëstablishing the ancient Roman empire, proposed to marry Irene, the Byzantine empress; a project baffled by her deposition.

This was a great era in the middle ages. The Christian kings of Spain, the Mussulmans of Fez, and the caliph of Bagdad, Haroun al-Rashid, sent ambassadors to present homages and gifts to the powerful western monarch.—However great as a warrior and the founder of an empire, Charlemagne deserves still more praise as a lawgiver, a civilizer, and a patron of learning, science, and art. He endeavored to establish order and a regular administration among the many nations which his sword had united, most of which were in a barbarous condition, totally different in their origin, language, and manners, and hostile to each other. Great national assemblies, known as *champs de Mai*, were held yearly in the spring. (See CHAMP DE MARS.) Other assemblies took place in the autumn, but were merely councils of military and ecclesiastical lords whose advice the emperor was pleased to receive, and who under his directions prepared the bills and projects to be submitted to the national meeting. In addition to the laws thus adopted by the nation, Charlemagne issued edicts known as capitularies, in which regulations for the administration of the empire as well as the management of the emperor's private property were enacted. The collection of these capitularies, a number of which have been preserved, is among the most valuable relics of the middle ages, and affords striking evidence of foresight, wisdom, and prudence in their author. His empire forming ethnologically various kingdoms, Charlemagne placed at their head his own sons with the title of kings; but they were nothing more than his lieutenants, the supreme power being concentrated in his own hands, he alone appointing the officers intrusted with the administration. His whole dominion was divided into a number of counties governed by earls (*Grafen*), and these were placed under the supervision of imperial delegates, or *missi dominici*, who four times every year visited the circuits assigned to them, holding provincial meetings and courts of justice, receiving the accounts of the collectors of public money, and adjusting the grievances of the people. He was thus enabled to control every branch of administration, as well as the proceedings of the various functionaries, who were appointed for a term of three years only. His protection extended to the clergy, increasing their wealth by a law upon tithes, their liberty by his respect for canonical elections, and their power by certain judicial prerogatives; but at the same time keeping them under his dominion, submitting them to the *missi dominici*, restricting their rights of asylum, interfering with questions of discipline and even of dogma, and causing the monasteries to be reformed by Benedict of Aniane. Trade and industry were not less objects of his fostering care; he granted privileges to merchants, and reduced as much as possible the tolls to which they were subjected. He established uniformity of currency, had the coinage executed in his palace, and regu-

lated the value of gold and silver coin. Beggars were not permitted to prowl about the country, but were provided for by the lords or communities to which they belonged. He bestowed particular attention upon general instruction and the revival of classical learning. Illustrious men were invited to his court from all parts of the world, and especially from Italy, to diffuse among his subjects various branches of learning, as grammar, rhetoric, logic, arithmetic, astronomy, history, theology, and medicine. The Anglo-Saxon Alcuin, a man of considerable information, if not thorough learning, seems to have been the leading spirit of this aggregation of teachers; he was the originator of the palatine school, a kind of normal institution, from which men thoroughly instructed were sent into the provinces, and constituting at the same time an academical society, which consisted of the emperor himself, several members of his family, mostly females, and the most distinguished of his courtiers. The academicians assumed names borrowed from antiquity; Charlemagne himself was styled David, while two of his daughters, Gisela and Rothruda, were called Delia and Columba. These ladies and some others were also engaged in making copies of ancient manuscripts, which task, however, specially devolved upon the monks of various monasteries. The emperor gave encouragement to this calling, paying largely for such copies, and establishing a library in his own palace at Aix-la-Chapelle. He himself was eager in his desire of knowledge and science, conversing with the learned in his leisure hours, and having books read to him during his meals. In the night he would frequently get up to study the course of the stars. Through such diligent application he became as much of a scholar as was consistent with his public duties; and some literary works were due to his encouragement, such as a German grammar and a collection of the national songs of ancient Germany. The fine arts were far from being neglected by him; he had the Gregorian chant adopted in the churches, and brought singers from Italy, whose concerts he patronized. Among the many palaces constructed by his order, we must mention those of Ingelheim, Nimeguen, and Aix-la-Chapelle. The last was a masterpiece of architecture, having been ornamented with columns and sculptural fragments brought from Italy; it was a large and magnificent building, the spacious halls and rooms of which were decorated in a splendid manner, and filled with most elegant and costly furniture. The basilica in the same city, erected also by Charlemagne, was equally celebrated, and became the pattern of many churches built during the 9th century. He moreover encouraged civil engineering; a wooden bridge 500 paces long was constructed at Mentz over the Rhine; and a gigantic canal was commenced, but not completed, to establish through this river and the Danube a water communication between the North and Black seas.—Char-

lemagne was of a tall and commanding figure; either standing or sitting, he had an air of grandeur and dignity; and notwithstanding the shortness of his neck and his obesity, he was well proportioned and remarkably active, with a firm step and manly appearance, his shrill voice alone being not in accordance with his person. An adept in the use of weapons, he was also an unrivalled swimmer and a consummate hunter. Although encouraging magnificence of attire among his courtiers, he was generally plainly dressed, giving preference to the old Frankish style of costume. He was frugal and temperate, and evinced great severity against drunkards. He had nine more or less legitimate wives, by whom he had at least twenty children. The only son who survived him was his successor, Louis le Débonnaire. Several of his daughters led a dissolute life and caused great scandal. The awe with which Charlemagne inspired his contemporaries increased as time rolled on; his historical deeds, amplified and adorned by poetry, powerfully seized upon the popular imagination; and the great emperor and his twelve legendary peers became the heroes of innumerable chivalric romances, which were recited or sung everywhere, and the collection of which is now styled "The Carolingian Cycle." His name has also won a halo of sanctity, the anti-pope Paschal III. having canonized him in 1165, and Louis XI. having ordered his anniversary to be celebrated on Jan. 28. The origin of many pious or learned institutions has been ascribed to him; and fiction and truth are so much blended in his history that it is difficult to disentangle the one from the other. But, however this may be, Charlemagne takes rank among those extraordinary men who, from time to time, appear to change the face of the world and inaugurate a new era in the destinies of mankind.—The cathedral of Aix-la-Chapelle stands on the site where Charlemagne had erected a chapel, which he designed as his burial place. The chapel was destroyed by the Normans, and rebuilt in its present form by Otho III. toward the close of the 10th century. The position of the tomb in which once reposed the remains of Charlemagne is marked by a slab of marble under the centre of the dome, inscribed with the words *Carolo Magno*. When the vault was opened by Otho III., the body of Charlemagne was found seated on his throne, clothed in the imperial robes. These relics are now deposited in Vienna, excepting the throne, which alone remains in the cathedral of Aix-la-Chapelle.—The literary works attributed to Charlemagne are: 1, his "Capitularies" (first collected by Ansegise, abbot of St. Wandrille; best edition that of Etienne Baluze, 2 vols. folio, Paris, 1677); 2, "Letters" contained in the collection of De Bouquet; 3, a "Grammar," of which fragments are to be found in the *Polygraphia* of Trithemius; 4, his "Testament," contained in Bouchel's *Bibliothèque du droit français*, tom.

iii. (folio, Paris, 1677); 5, some Latin poems, such as the "Epitaph of Pope Adrian" and the "Song of Roland;" 6, the "Caroline Books."—Among the books which treat of Charlemagne, we may refer to the great biography of his contemporary, Eginhard, *Vita Caroli Magni*, in Duchesne's *Rerum Francorum Scriptores* (best edition by Pertz, in the *Monumenta Germanie Historica*; Monachus Sagallensis, *De Gestis Caroli Magni Libri II.*; Donatus Acciaiolus, *De Vita Caroli Magni Commentarii*; Leclerc de la Bruère, *Histoire du règne de Charlemagne*; Hauréau, *Charlemagne et sa cour*; Struve, *Rerum Germanicarum Scriptores*, tom. i.; Dippold, *Leben Kaiser Karls des Grossen* (Tübingen, 1810); Gaillard, *Histoire de Charlemagne* (2d ed., 4 vols., Paris, 1819); Lorenz, *Karls des Grossen Privat- und Hofleben*, in Raumer's *Historisches Taschenbuch* (1832); Abel, *Jahrbücher des fränkischen Reichs unter Karl dem Grossen* (Berlin, 1866 et seq.). Piper has edited from the original MS. *Karl des Grossen Kalendarium und Ostertafel* (Berlin, 1858). Among the more popular works upon this monarch may be mentioned the "History of Charlemagne," by G. P. R. James (1832), and Bulfinch's "Legends of Charlemagne" (1863).

CHARLES II. See CHARLES II., THE BALD, France.

CHARLES III., the Fat, the last emperor of the Carolingian dynasty, born about 832, died in 888. He was the third son of Louis the Germanic, and received the kingdom of Swabia for his portion of his father's possessions. After the death of his oldest brother, Carloman of Bavaria, in 880, he succeeded him in the imperial dignity and in the possession of Italy; and after that of his younger brother, Louis of Saxony, in 882, he became king of all Germany. On the death of Carloman of France in 884, Charles the Fat united France under his sceptre with Germany and Italy, and the vast empire of Charlemagne was thus again vested in one and the same sovereign. He proved, however, unworthy of this exalted position. He became a passive tool in the hand of his minister, an inactive spectator of the sufferings of his people, and was covered with domestic as well as public disgrace. His incapacity and cowardice soon became manifest. Paris being besieged by the Northmen, he marched against them with a large army from Germany; but instead of fighting the enemy, he offered them large sums of money and the pillage of Burgundy to obtain their retreat. This shameful conduct raised general indignation; the Bavarians, Saxons, Thuringians, and finally the Alemanni, deserted him and deposed him solemnly in an assembly at Trebur in 887. He had already been disowned by the French. He died the next year, poor and forsaken, in a cloister near Constance. He was noted for inordinate love of the pleasures of the table, and this as well as his corpulence gave him the surname of "the Fat."

CHARLES IV., emperor of Germany, a member of the family of Luxemburg, and son of King John of Bohemia, born in Prague, May 13, 1316, died there, Nov. 29, 1378. When seven years old he was taken to Paris to be educated at the French court; but on the death of the French king Charles IV. in 1328, his father removed him to the court of Luxemburg, and after a four years' residence there summoned him to Italy, where King John had been appointed the viceroy of the emperor Louis the Bavarian, with whom he was at that time in close friendship. The vicerealty was now for a time transferred to Charles, who soon exchanged the onerous office for the margraviate of Moravia. The relations of King John with the emperor had in the mean time changed, and they soon became openly hostile. In the war excited by Louis's summary disposition of Carinthia, John joined the opponents of the emperor; and Charles, acting as his father's ally, conquered and laid waste (1337) the lands of the count von Görz, one of the most important of his enemies. In the few years following the Carinthian war the enmity which had long existed between Louis and the popes grew more and more bitter. Clement VI., who succeeded to the papal chair in 1342, in the next year renewed the excommunication already pronounced against the emperor, pushed his hostility so far as to excite for a time the resistance of the German diet, and spared no pains to raise up enemies to Louis throughout the empire. Among these enemies Charles already occupied a leading place when, in 1346, his father's death at the battle of Crécy left him king of Bohemia. The time now seemed to have arrived for a successful and final opposition to Louis's rule; and at the instigation of the pope five electors and a great number of the papal party met at Rhens on the Rhine and chose Charles emperor, in July, 1346, but not until he had submitted to such humiliating conditions as they wished to impose upon him. In spite of this election he was still too weak to actually assume the imperial dignity in anything but name, and Louis maintained his position successfully until his death in 1347, an event which seemed at last to leave Charles's way entirely clear. But no sooner was his chief rival dead than new opponents met him. The electors of the Palatinate and Brandenburg, with other powerful rulers, declared his election void, and offered the imperial crown first to Edward of England, who refused it; then to the margrave of Meissen, who also declined it; and finally to Count Günther of Schwarzburg, who accepted it. Charles made no preparations for an open conflict with this formidable antagonist, but devoted himself to aiding various schemes against Günther's supporters—upholding the pretensions of Waldemar, a pretender to the electorate of Brandenburg, and endeavoring by this and similar means to compel his enemies to withdraw their aid from his rival. The con-

test was soon terminated, however, by the withdrawal of Günther himself, and his death soon afterward, brought about, it was said, by poison; a report which Charles's enemies everywhere used against him. Charles now sought a reconciliation with his opponents; he took for his second wife the daughter of the elector palatine, and gave his own daughter in marriage to Duke Rudolph of Austria; and finally so won over those who had opposed his election that they gave in their adhesion, and he found himself at last in undisputed possession of the imperial throne. The next few years he employed in plans for increasing the power and wealth of his immediate family. He secured through his father-in-law the right of inheritance to the Palatinate; and on the death of his second wife he married the daughter of Duke Henry of Jauer, gaining with her the prospective possession of the principality. In 1354 he visited Italy, and was crowned king of that country, his coronation being celebrated with great pomp at Milan. In the spring of 1355 he was crowned emperor at Rome by Cardinal Bertrandi, but, according to a vow imposed upon him, he spent but one day within the city walls. His conduct with regard to the great political disputes then agitating Italy was indecisive and spiritless; he made enemies both of the Guelphs and the Ghibellines, and seemed to care for little but the acquisition of large sums of money, which he took with great avidity in return for the various honors and privileges he bestowed. Hated by all parties, he hastened back to Germany soon after his coronation. In 1356 he issued the famous "golden bull," prescribing the rights and duties of the electors and various princes of the empire, and the manner of the election of emperors; regulating taxes, the disposition of revenues, and the coinage; limiting the rights and privileges of cities; and containing other regulations for the administration of the affairs of the imperial government. This decree, which a German writer calls the only thing of importance that Charles did for the empire, remained for centuries one of the principal parts of its law; but the pope, enraged at finding himself left by its provisions almost powerless to influence elections, extorted as compensations from the emperor, who showed a life-long subservience to papal authority, numerous concessions of privileges to the clergy. Charles's weak rule permitted feuds and dissensions in every quarter of the countries he governed. Zürich and the duke of Austria carried on a war which Charles was compelled to end by forcible interference in 1356; later he himself became involved in difficulties with Swabia, and then with Count Eberhard of Württemberg; while brotherhoods of knights little better than robbers, and princes in the prosecution of personal feuds, devastated and plundered at will throughout Germany. Troubles arose in Italy. The Visconti, whom Charles had confirmed in all their usurped power, ex-

exercised the greatest tyranny throughout the country, especially against the church; and in 1368 the emperor, summoned to the pope's aid, marched into Italy with a considerable army, only to allow himself to be bribed by the usurpers, and to retire with immense sums of money. During the remaining ten years of his life he occupied himself chiefly, as he had done throughout his reign, with care for the interests of his family and of Bohemia. By treaties, purchases, and all the means in his power, he added lands to the possession of his house; he had secured the right of inheritance to Brandenburg in 1363; in 1368 he had paid an immense sum for the possession of Silesia and Lower Lusatia; and in 1373 he annexed the margraviate of Brandenburg to Bohemia. By lavish gifts to the electors he secured the recognition of his son Wenceslas as his successor, and before his death devised to him also the crowns of Bohemia and Silesia. Such talents as Charles possessed were generally employed for purposes of deceit; he was neither a warrior nor a statesman, but devoted himself to schemes for money-getting with something of the petty spirit of a miserly trader—bargaining, overreaching, and employing the lowest means for gaining comparatively trifling sums. Such benefits as he conferred upon the empire were generally the indirect consequences rather than the direct objects of his plans; and although he paid some attention to education, art, the embellishment of the great cities, and the advancement of trade, yet he neglected the interests of the empire as a whole, and left it a prey to feuds and lawlessness.

CHARLES V., emperor of Germany, and king of Spain under the title of Charles I., born at Ghent, Feb. 24, 1500, died at the monastery of Yuste, near Plasencia, Spain, Sept. 21, 1558. He was the eldest son of Philip of Burgundy, archduke of Austria, and Joanna, daughter of Ferdinand and Isabella of Spain. His paternal grandfather was the emperor Maximilian, Philip of Burgundy being the offspring of that emperor's marriage with the beautiful Mary, daughter of Charles the Bold and Isabella of Bourbon. By the death of his father in 1506 Charles became, when only six years old, heir presumptive to the entire possessions of the house of Hapsburg in Germany, in right of his grandfather Maximilian, and to the dukedom of Burgundy, as it was then called, afterward the Spanish Netherlands, in right of his grandmother Mary. He was educated in this portion of his great possessions, under the care of William Croy, lord of Chièvres, who had him thoroughly instructed in the learning and accomplishments of the time; he brought him up stern, cold, regular in his life, and somewhat formal in manner; the tendency of his education being to make him rather a German in spirit than a Spaniard. By the death of Ferdinand, his maternal grandfather, in 1516, he inherited the whole kingdom of Spain, the

Castilian portions of which Ferdinand had governed since 1507 as regent, the kingdom of Naples, and the then literally boundless Spanish empire in America. In spite of his youth, he at once ascended the Spanish throne and took the conduct of affairs into his own hands. He was now the most powerful ruler in Europe. His boast that the sun never set on his dominions was justified by the greatness of his possessions. He bore on his escutcheon two globes, and had stamped upon his coin two pillars representing the pillars of Hercules (denoting the western limit of Europe), with the motto *Plus ultra* ("More beyond"). The armies at his command in his various territories were enormous; and the revenues upon which he could draw seemed practically unlimited. Thus situated, it was natural that Charles should direct his first aspirations toward the imperial power so long held by his grandfather. He was early looked upon as one of the leading candidates for the succession; and on the election following Maximilian's death in 1519 he was chosen emperor (June 28), Francis I. of France being his only really dangerous competitor for the honor. He was crowned at Aix-la-Chapelle Oct. 23, 1520, after having signed an agreement (the *Wahlkapitulation*) intended by the electors to restrain him in some degree in the arbitrary exercise of the immense power at his command. He entered upon his administration just as Luther had aroused Europe by those acts which formed the beginning of the reformation. The strong excitement now pervading Germany, and the multitude of unsettled questions besides this of the religious controversy, determined Charles to call a great diet for the discussion of affairs. It met at Worms in the winter of 1521; Luther appeared before it and made his memorable defence on April 17 and 18. But the emperor did not yet perceive the importance of the religious agitation which had arisen throughout the northern portion of his empire. His mind was still occupied with affairs in Spain, which were in a most unsettled state. He was also about to begin a war with France; for although he and his jealous and disappointed competitor Francis had sworn that the result of the election should not disturb the peace between them, a pretext was not long wanting to give the two rivals an opportunity to try their strength. Charles's delay in fulfilling his promise to restore Navarre to Henri d'Albret formed the wished-for excuse; it was made a *casus belli*, and both monarchs prepared for the conflict. With his attention principally occupied by these plans, the emperor was more annoyed by than interested in the religious controversies of Germany; he issued a decree of outlawry against Luther, hoping thus hurriedly to dispose of the matter in its beginning, and before the close of the year he left Germany for Spain by way of the Netherlands and England. His visit to the latter country was made for the purpose of gaining over Henry

VIII., whom Francis was endeavoring to persuade into an alliance in the coming war; and so far as defeating this plan was concerned, Charles's interviews with Henry were successful. Arrived in Spain, he subdued a revolt of the cities of Castile against the crown; but he had barely succeeded in restoring order when the French war broke out both along the borders of Navarre and of the Netherlands; and at the same time the Turks under Solymán captured Belgrade and penetrated into Hungary, the ill-fated king of which, Louis II., was Charles's brother-in-law. The French war first received Charles's full attention. The conflict rapidly extended, and attained its greatest force in Italy. The French at first met with success on the Spanish border, but they were defeated in the Netherlands; and Charles added greatly to his strength by at last gaining Henry VIII. of England to his side, after an unsuccessful attempt made at Calais to conclude a general peace. He now added to his previous good fortune a series of brilliant victories in Italy, won by his generals Prospero Colonna and Frundsberg. Another great gain for him was the desertion of the constable of France, Charles of Bourbon, to the imperial army. On Feb. 24, 1525, the battle of Pavia crowned his triumphs. Francis was taken prisoner, and was treated with courtesy by his conqueror, who, however, imposed such hard conditions of peace that the French king at first declared that he would rather remain a prisoner for life than submit to them. A compromise was at last effected, and though its conditions were but little better than those of the former offer, it was confirmed by the treaty of Madrid, Jan. 14, 1526; an agreement which left Charles even much more powerful than at the beginning of his reign. Meanwhile matters in Germany had been left largely under the charge of Charles's brother Ferdinand, to whom he had ceded his properly Austrian possessions, and who had conducted affairs in the empire with great skill and success. Through the conflict between the Swabian confederation and Duke Ulrich of Würtemberg, he succeeded in acquiring the latter's territory, which was subsequently given to Ferdinand, who, after the death of Louis II. at Mohács (1526), had become his successor both in Hungary and Bohemia. The confederation itself Charles made use of as a means of help against the Turkish invasion, which, after Mohács, threatened the empire itself. The result of the rapid increase of Charles's power was to excite the greatest anxiety among the governments of Europe, no one of which was now able to cope successfully with the emperor. Coalitions of several states could alone give any hope of adequate resistance to his encroachments. The pope, Clement VII., who perhaps had most of all reason to fear the growth of the imperial power, now formed an alliance with several Italian states and France; declared Francis absolved from his agreements in the treaty of Madrid, on the ground that the concessions he

had made had been extorted by force; and laid his plans for freeing all Italy from the rule of the emperor. But the coalition proved unavailing. The imperial troops under the constable de Bourbon penetrated to Rome, captured and sacked the city, and compelled the pope to surrender himself to Charles, treating the pontiff with no little indignity (May, 1527). The emperor now attempted to play a double part. He affected great indignation at the disrespect shown to the papal authority, declared that the capture of the pope's person had been made without his knowledge, and even assumed mourning, with his whole court, on account of his grief at the misfortunes of the holy father; but he continued to hold the pope a close prisoner for seven months. But Charles himself was now almost as desirous of peace as the members of the defeated coalition. He was in a position to force his enemies to accept the hardest terms, and on June 29, 1529, he signed with the pope the treaty of Barcelona; shortly afterward he also ended the war with Francis by the treaty of Cambrai (Aug. 5). By these treaties he gained possession of most of Italy, and compelled the payment of a large indemnity by his antagonists; the pope was forced to crown him at Bologna, and his power was more firmly established than ever. Charles now (1530) turned his attention entirely to the affairs of Germany. His first aim was to smooth over and pacify rather than to crush the religious dissensions now most violently agitating the country; for he needed the help of the German princes against the Turks, who had in 1529 even penetrated to Vienna. To further these plans, the emperor called a diet at Augsburg, which assembled in March, 1530. But all efforts at a reconciliation of the contending parties were useless. The opportunity given by the diet called forth in June the celebrated Augsburg confession, which only served to show more clearly than ever the impossibility of half-way measures; and when the emperor refused to recognize their creed as permissible in the empire, the Protestant princes in a body declared that they would give him no aid against the Turkish invasion; and, meeting at Smalcald in 1531, they formed a confederation which was secretly aided by England and France. The Turks continued their assaults; and by 1532 Charles found himself so hard pressed that he was forced at last to give way. By the Nuremberg agreement he engaged to permit the Protestants religious freedom for the time being, relegating the final question of the status of Protestantism to a council to be held in the future. Aided now by the Protestant forces, the imperial army advanced against the Turks, over whom Charles's general, Schärtlin, had in the mean time gained an important victory. The Mohammedans did not wait for actual conflict, but retreated through Hungary. The emperor now went to Italy, and debated with the pope concerning a projected council by which it was proposed to settle the affairs

of Germany; but he accomplished no immediate result. In 1535 he began from Spain a campaign against the Turkish pirates, who had possessed themselves of Tunis, and were annoying the Spanish fleets. Tunis was taken, and 22,000 Christian slaves who had been imprisoned there were restored to liberty. New troubles had broken out in Germany. Ulric of Württemberg had regained his possessions, and the Swabian confederation had been broken up (1533). A new war broke out with Francis I., who this time effected an alliance with the Turks; but though he invaded Italy at the same time that Solymán renewed his attack on Hungary, Charles's generals defeated both. A truce of ten years, agreed upon in 1538, with much talk of an enduring peace, had hardly begun before it was broken by a new disagreement about the terms upon which such a peace could be arranged. Henry VIII. of England now joined Charles; and after experiencing a severe defeat at Ceresole, and repairing it by victories in France and at sea, the latter again came out of the war as conqueror, at the peace of Crespy, Sept. 18, 1544. During the progress of the conflict he had also found time and means to make his power in Spain more nearly absolute through changes in the form of government (1539), to repress a revolt in the Netherlands (1540), and to undertake an expedition against Algiers (1541), which however was a failure. The peace of Crespy concluded, Charles again turned toward German affairs; and allying himself with the pope, Duke Maurice of Saxony, and his own brother Ferdinand, he began a campaign against the Protestant princes of the Smalcald league, who had aroused his anger by their opposition to the settlement of religious questions by a council. He defeated them in the battle of Mühlberg, April 24, 1547, took away the territory of the elector of Saxony and gave it to Duke Maurice, issued a decree against Magdeburg for espousing the Protestant cause, and finally, in a second diet at Augsburg (1548), issued the so-called *Interim*, a regulation fixing the degree of toleration and the forms of faith to be observed pending the still anticipated decision of the general council assembled at Trent. But his plans were suddenly defeated by a rapidly executed scheme of his former ally Duke Maurice, who was now alarmed at the apparent tendency of Charles's measures, and who allied himself with Henry II. of France, who had in 1547 succeeded Charles's old enemy Francis. In the summer of 1552 Maurice suddenly appeared with an army before Innspruck, where the emperor lay ill of the gout, at the same time that Henry invaded and took possession of a large portion of Lorraine. Charles fled before Maurice, narrowly escaping capture; he was unprepared for a war, and yielded to the Protestants' demands in the treaty of Passau, Aug. 2, 1552, which gave them entire religious freedom. He made some further efforts to

contend with Henry, but found himself unable to recapture what he had lost. Thus suddenly deprived of much of his power, depressed by illness, and disappointed in his chief plans, the emperor announced at the Augsburg diet of 1555 his intention of retiring altogether from the world. Resigning his kingdoms of Spain, the Indies, Naples, and the Netherlands to his son Philip in 1555-'6, he entered the Spanish monastery of Yuste, near Plasencia. His brother Ferdinand succeeded him as emperor. At Yuste Charles spent the remainder of his life, still endeavoring to exercise an influence on the politics of Europe, remaining in constant correspondence with the principal men of the various states, and strangely mingling these occupations with study, mechanical labor, and composition. Shortly before his death he had all the ceremonies of his funeral performed, even taking his place in the coffin prepared for his body.—A man of the most remarkable executive ability, manifesting a power almost amounting to genius in the formation of his plans, and an almost unparalleled energy in carrying them out, Charles was nevertheless shortsighted in regard to the great questions of his time, and never freed his action from the narrowest motives of personal or family aggrandizement. "To gain the empire over Francis, and to leave to Don Philip a richer heritage than the dauphin could expect, were," says Motley in his masterly summing up of the emperor's character, "the great motives of the unparalleled energy displayed by Charles during the longer and more successful part of his career." His war with the reformation was rather against its political than its religious tendencies, and, until it was too late to oppose it with success, he was blind to the vast importance of the movement. Motley says of him that in spite of his rigid observance of religious rites, the bigoted intolerance he manifested toward the close of his life, and his harsh measures against the Protestants of the Netherlands, he was no fanatic. "He believed in nothing, save that when the course of the imperial will was impeded, and the interests of his imperial house in jeopardy, pontiffs were to succumb as well as Anabaptists." His private life, for a powerful monarch of that age, was decent and orderly; his greatest vice was gluttony, which in his retirement he carried to the utmost excess. In manner he was cold, formal, and repellent, without grace or the power of winning; but he often succeeded in persuading by the ingenuity of his arguments. Of his military and administrative talents Motley says: "He was inferior to no general of his age. He was the first to arm when a battle was to be fought, and the last to take off his harness. He was calm in great reverses. It is said that he was never known to change color except upon two occasions; a man of a phlegmatical, stoical temperament, without a sentiment, and without a tear; essentially a man of action, a military chieftain. Yet,

though brave and warlike, he was entirely without chivalry. He trampled on the weak antagonist, whether burgher or petty potentate. He was as false as water. He inveigled his foes who trusted to imperial promises by arts unworthy an emperor or a gentleman. He was not only greedy for additional dominion, but he was avaricious in small matters, and hated to part with a dollar. He knew men, especially he knew their weaknesses, and he knew how to turn them to account. He was indefatigable in the discharge of business; and if it were possible that half a world could be administered as if it were the property of a private individual, the task would have been perhaps as well accomplished by Charles as any other man."—Among the works treating specially of Charles V., the most important are those of Antonio de Vera, *Vida y hechos de Carlos V.*; Prudencio de Sandoval, *Historia de la vida y hechos del emperador Carlos V.*; Robertson, "History of the Reign of the Emperor Charles V." (London, 1769; Lanz, *Correspondenz des Kaisers Karl V.* (Leipsic, 1844-'6); and Charles's instructions to his son Philip II., translated into French by Teissier (the Hague, 1700). The MS. of a description of the capture of Tunis, in the handwriting of Charles, dated Tunis, July 23, 1535, and addressed by him to his sister Mary, regent of the Netherlands, has been discovered by M. Gachard, keeper of the Belgian archives. For the life of Charles V. after his retirement, the best original authorities are MSS. in the archives of Simancas. Upon these are chiefly founded the Gonzalez MS.; the *Chronique de Charles Quint*, by Pichot (Paris, 1854); the *Retraite et mort de Charles Quint*, by Gachard; Mignet's *Charles Quint*, &c.; Stirling's "Cloister Life of the Emperor Charles V.;" Prescott's appendix to Robertson's history; and Motley's "Rise of the Dutch Republic," vol. i.

CHARLES VI., emperor of Germany, and a pretender to the throne of Spain under the title of Charles III., the second son of the emperor Leopold I., and the last in the male line of the pure Hapsburg family, born Oct. 1, 1685, died Oct. 20, 1740. He was brought up in the expectation of succeeding to the Spanish throne, which he should by right have inherited from the childless Charles II., the reigning Hapsburg king. But the latter becoming ill, the question of the succession began to occupy the attention of several of the European governments, and became a subject of intrigue especially for the reigning families of France and Bavaria, both of which claimed the right to the inheritance through their descent in the female line; Louis XIV. being, like Leopold I., the son of a daughter of Philip III., and the Bavarian prince Joseph Ferdinand being a grand-nephew of Charles II. through Maria Antonia, daughter of the Spanish king's sister. The complications resulting from these various claims were somewhat simplified by the sudden death of Joseph Ferdinand in February,

1699, which left the French king untrammelled in his efforts to secure recognition of his alleged rights over the throne of Spain. The marquis d'Harcourt, Louis XIV.'s ambassador at Madrid, outmanœuvred Count Harrach, the German emissary, completely gained the ear of Charles II., and finally induced him to make a will declaring Philip of Anjou, the second grandson of Louis, to be heir to the Spanish throne, and confirming him and his heirs in the right of succession. This will was dated Oct. 2, 1700. On Nov. 1 Charles II. died at the capital, and 12 days later Louis XIV. declared that on the part of his grandson he accepted the possession of the kingdom of Spain. Philip, under the title of Philip V., was crowned at once, and at first met with no opposition, being recognized by all the European rulers excepting the emperor Leopold. But in the autumn of the next year, seeing renewed cause to fear Louis's encroachments, England and Holland decided to sustain the claims of Charles. On Sept. 7, 1701, a triple alliance was signed at the Hague between these two powers and Austria; and in 1702-'3 Prussia, the German empire, and Portugal joined the coalition. In 1703 Charles was proclaimed at Vienna king of the Spanish monarchy, under the title of Charles III. He went by way of Holland to England, whence he set sail with 12,000 men for Spain, nearly all parts of which were now held by the French. He landed at Lisbon, and with the assistance of the Portuguese attempted to invade Spain on its western frontier, but was repulsed by the duke of Berwick. In Catalonia and Valencia, on the opposite side of the peninsula, the population was supposed to be better inclined toward him; and in 1705, Peterborough having arrived at Lisbon with reinforcements from England, Charles embarked with his suite on the British fleet and sailed for the Mediterranean. Valencia received him with favor, and siege was laid to Barcelona, which was compelled by the genius and enterprise of Peterborough to surrender in October. Eight months later the English under the earl of Galway took Madrid, where Charles was again proclaimed king in June, 1706; but he remained at Barcelona and refused to go in person to receive the homage of his subjects at the capital, because he had not the equipage and retinue that he considered proper—an action very characteristic of the man. The war had now assumed a doubtful aspect, each side winning victories and experiencing defeat, and the capital twice changing hands between the contending armies. Charles personally manifested, or was permitted, but little activity. He remained in the peninsula until the death of his brother the emperor Joseph, who had in 1705 succeeded Leopold, recalled him in 1711 to Germany. Charles now came into possession of all the countries that had been ruled by his father; which changed at once the whole aspect of affairs. Those of the great powers who had

entered the war to prevent the accumulation of too great possessions in the hands of the French king, now feared a similar massing of power under the government of Charles; and after the latter's coronation as emperor, which took place at Frankfurt in December, 1711, they began, at first through secret negotiations and afterward openly, to withdraw from his support in the matter of the Spanish crown. Charles at first attempted with some success, with the assistance of Prince Eugene, to carry on the war in the Netherlands; but when in 1713 his former allies made peace with France by the treaty of Utrecht, and when the princes of the empire during the following year manifested the greatest reluctance to give him the aid he needed in his plans, he found himself compelled to yield, and concluded the peace of Rastadt in 1714, abandoning his chief claims, and securing only the Spanish possessions in the Netherlands and Italy. In this way terminated the war of the Spanish succession, which for more than 12 years had agitated all western Europe, and had employed the most famous military leaders of the time.—In 1715 Charles undertook the defence of the Venetian republic against the Turks, who had declared war against it, and Prince Eugene gained during the campaigns which followed the decisive victories of Peterwardein (Aug. 5, 1716) and Belgrade (Aug. 16, 1717), besides numerous minor successes. In 1718 the war was ended by the peace of Passarowitz, by the terms of which Belgrade, northern Servia, and parts of Slavonia, Bosnia, and Wallachia were added to the imperial dominions. But Charles had only terminated one conflict because he found himself engaged in another. The Spaniards attacked Sicily, and sought to win back the Italian possessions they had conveyed to Charles at Rastadt. In repelling this attempt the emperor gained the alliance of England, France, and Holland; and the war made against these combined forces was of short duration. An English fleet drove the Spanish troops from Sicily, and after the fall of the Spanish minister Cardinal Alberoni, to whose schemes the conflict owed its origin, peace was made in 1720. By the death of his only son, Charles had been led to turn his attention to the question of the Austrian succession. Anxious to hand down his realms to his immediate descendants, he had in 1713 issued his pragmatic sanction, authorizing the transmission of the powers of his family through the female line, and appointing his daughter Maria Theresa as his successor. The consent of the daughter of his brother Joseph and of the princes of the empire was easily obtained; but France refused to recognize the new law, as did also Bavaria and Saxony, to the heirs of whose thrones Joseph's two daughters were married. To obtain the support of the principal European states in this matter now became one of the chief aims of Charles. His persistent efforts for some years failed to produce any decisive result, but

in 1725 he succeeded in gaining the alliance of Spain. A coalition for opposition to his plan was now formed by England, France, Denmark, and Holland; and when Charles had been successively joined by Russia and Prussia, whose support he purchased by immense sacrifices of territory and privileges, all the leading powers of Europe stood in two opposing parties. A great war seemed imminent, when through the intervention of the pope an arrangement was brought about, and signed at Vienna, March 16, 1731, by which, at the cost of still greater concessions on the part of the emperor, the pragmatic sanction was at last recognized by all. Spain's consent was purchased by the cession of Tuscany, Parma, and Piacenza; France was conciliated by the promise of Lorraine; England and Holland by the abolition of the commercial society of Ostend; and Augustus II. of Poland and Saxony, by the assurance of the succession to the crown of Poland of his son Augustus III. In accordance with this last promise, Charles, upon the death of Augustus in 1733, declared at once for his descendant; and in this he was joined by Russia; but France, Spain, and Sardinia supported the claims of Stanislas Leszczynski, the former king, who still had a strong party in the country of which he had once lost the crown. A new war now broke out; but Charles was not long able to cope with the great force brought against him. Russia aided him but little; the French overran and conquered Milan, nearly all Lombardy, and all Lorraine; the Spaniards possessed themselves of Naples and Sicily; and in order to secure his end, and give the succession in Poland to Augustus III., at the preliminary peace of Vienna, Oct. 3, 1735, he was obliged to permanently abandon all these portions of his territory. Equal misfortune attended him in a war which in the next year he declared against the Turks. In the three years of its continuance he lost nearly all the conquests made in his last conflict with the sultan; and when, at the solicitation of Maria Theresa, peace was again restored by the treaty of Belgrade, Sept. 18, 1739, his power was at a lower ebb than ever before; his armies were entirely demoralized; the finances of the empire were in a state of the greatest possible confusion; and the influence of the Hapsburgs had almost disappeared in the affairs of Europe.

CHARLES VII. (Karl Albrecht), emperor of Germany, born in Brussels, Aug. 6, 1697, died in Munich, Jan. 20, 1745. His father was Maximilian Emanuel, elector of Bavaria, and governor of the Spanish Netherlands. Joseph I., having taken possession of the elector's possessions in Bavaria, outlawed him, and detained his son as prisoner at Klagenfurt and Görz, where the young prince, however, enjoyed every advantage of education. Liberated in 1714, after the conclusion of the treaty of peace of Rastadt, Charles Albert was sent as commander of the troops against Turkey in 1716-'18. In 1722 he married a daughter of

Joseph I., having previously renounced all rights arising from this marriage to the Austrian dominions, and adhered to the pragmatic sanction. Four years afterward he succeeded his father as elector of Bavaria. His first act now was to protest against the pragmatic sanction, and after the death of Charles VI. in 1740 he put forth his claims to the Austrian succession, which had already been urged by his father, immediately on the accession of Maria Theresa. In the midst of the general opposition to which this accession gave rise, he succeeded in forming an alliance with France and Spain, at Nymphenburg, May 18, 1741. With the assistance of French troops he captured Linz, where he was proclaimed archduke of Austria; and advancing further, surprised and captured Prague, where he caused himself to be proclaimed king of Bohemia. Almost immediately afterward he was unanimously chosen German emperor, and proceeded to Frankfort, where, on Feb. 21, 1742, he was crowned by his brother, the elector of Cologne. The Hungarians, however, rose in favor of Maria Theresa, whose army occupied Munich, reconquered Upper Austria and Bohemia, and compelled Charles to resort to flight. The efforts of his general, Seckendorf, enabled him to return to Munich, April 19, 1743; but in June he was again expelled by the victories of Maria Theresa's troops. About the same time his allies, the French, were defeated near Dettingen by the English allies of Maria Theresa. Only by his alliance with Frederick of Prussia (May 22, 1744), who invaded Bohemia, and by the exploits of Seckendorf, was he enabled to turn the tide and regain his capital; a success which he accomplished just before his death.

IV. NAPLES.

CHARLES OF ANJOU, king of Naples and Sicily, count of Anjou and Provence, born about 1220, died in 1285. He was the youngest brother of Louis IX. of France, and married Beatrice, the heiress of Provence, thus becoming related to Henry III. of England and Richard of Cornwall, the king elect of Germany, who had married the two eldest sisters of Beatrice. He accompanied his brother in his first crusade, landing with him in Egypt in 1249, and being taken with him a prisoner by the Saracens. On his liberation he came back to Provence, where he had first to reestablish his authority in some of the large cities. He greatly assisted his mother, Blanche of Castile, in her regency during the king's absence in Palestine. After the death of the emperor Conrad IV. the kingdom of the Two Sicilies was offered to him by Pope Urban IV., in defiance of the rights of the Hohenstaufen. Crowned at Rome, he marched against Manfred, the natural brother of Conrad IV., who had been proclaimed king by the Sicilians. At Grandella, near Benevento, he won a great battle in 1266. Here his rival was slain, and he assumed at once over the reluctant Italians a power which

he maintained by unmitigated severity. The numerous adherents of the Hohenstaufens, aware of the popular feeling, invited young Conradin, son of Conrad, to Italy. This prince, then scarcely 16 years old, entered his hereditary states, where he was enthusiastically received. Everything seemed to promise him victory; his army was numerous and full of confidence; but Charles, with forces comparatively small, succeeded in defeating his opponent in 1268, at the battle of Tagliacozzo, and making him his prisoner. He subsequently had him executed on the principal square of Naples, after going through the mockery of a trial. The friends and adherents of the prince were also unmercifully dealt with, and the unpopularity of the conqueror was still further increased by the insolence of his French soldiery. In 1270 Charles sailed for Tunis, to join his brother Louis IX. in his second crusade. On his arrival he found Louis dead; but he succeeded in compelling the bey of Tunis to acknowledge himself his tributary. On his return he planned the conquest of the eastern empire, but his schemes were baffled by the insurrection commonly called the "Sicilian vespers," March 30, 1282. Sicily placed itself under the protection of Don Pedro of Aragon, and Charles tried in vain to reconquer the island. He was overpowered by the superior cunning of Pedro and the prowess of the admiral Roger de Loria. During this hard contest it was proposed that a duel should take place at Bordeaux between the two princes, a proposal eagerly accepted by Charles, although he was already 60 years old; but the offer was only made by Pedro to gain time, and the Aragonese did not appear on the appointed day. Charles repaired in haste to Italy, hoping to take revenge on the battle field; but on arriving at Gaeta he learned that his son had been defeated and taken prisoner in a naval engagement with the Aragonese admiral. This misfortune preyed heavily upon his mind; the inflexible warrior now became as wavering as he had been resolute. His death soon followed. He was succeeded by his son, Charles II., called the *Lame*, who began to reign in 1289, after his liberation. He also tried in vain to reconquer Sicily, and died in 1309.

CHARLES III., of Durazzo, king of Naples and Hungary, born in 1345, assassinated in Buda, February, 1386. He was the son of Louis de Duras, or Durazzo, count of Gravina, who had rebelled against Queen Joanna I. of Naples, and died in prison. The queen had adopted Charles as her son, but in 1380 set him aside in favor of Louis duke of Anjou, father of Charles V. of France. Charles of Durazzo then entered into an alliance with Louis the Great, king of Hungary, the bitter enemy of Joanna. At the instigation of Pope Urban VI. and of the king of Hungary, Charles levied an army and set out to invade Naples. Passing through Rome, he was crowned by the pope, entered Naples in July, 1381, defeated the troops of the queen, and made a prisoner her fourth husband, Otho

of Brunswick. The queen also fell into his hands, and he urged her to confirm her former adoption of him; upon her refusal he shut her up in the castle of Muro, where she was put to death by his order, May 22, 1382. The arrival of the duke of Anjou brought on a desultory war which lasted two years, until the duke died, Oct. 11, 1384. Urban VI. was then at Nocera, in the kingdom of Naples, intriguing for the crown for his nephew. Charles, who was ill, invited Urban to come to Naples, but received for reply that it was customary for kings to come to popes, not for popes to go to kings. Margaret, the wife of Charles, in order to get rid of the pope, prohibited the bringing of wine to Nocera, whereupon Urban excommunicated Charles and his queen, and laid the kingdom under interdict, and ineffective hostilities took place. In 1385 the Hungarian magnates, discontented with the rule of Elizabeth, widow of Louis the Great, invited Charles to assume the government. He repaired to Hungary, and was crowned Dec. 31, 1385; but on the 6th of the following February he was stabbed by order of Elizabeth, and in her presence; he survived three weeks. As he was under excommunication, his corpse remained without sepulture till 1391.

V. SARDINIA.

CHARLES ALBERT (CARLO ALBERTO AMADEO), king of Sardinia, born Oct. 2, 1798, died at Oporto, July 28, 1849. The son of Charles Emanuel of Savoy-Carignan, of a younger branch of the royal family, and having consequently no hope of ever obtaining the crown except by the extinction of the direct line, he early adopted liberal principles, and was even affiliated with the carbonari. Being appointed regent, March 13, 1821, on the abdication of King Victor Emanuel, he proclaimed in Sardinia the constitution adopted by the cortes of Spain and appointed a provisional junta; but his plans were baffled by the marching of an Austrian army into Piedmont, and the rejection by King Charles Felix of all his measures. He then withdrew from Turin, resigned his office, and left the kingdom. In 1823 he served as a volunteer in the French army which under the duke of Angoulême invaded Spain, to crush its restored liberty; he was consequently charged with perfidy by his old associates. In 1824 he was allowed to return to Turin, and for a while in 1829 held the post of viceroy of the island of Sardinia. On the death of Charles Felix, the last of the elder branch, April 27, 1831, Charles Albert succeeded to the throne, and adopted a policy which was far from realizing the anticipations of the partisans of freedom. Some reforms took place; the feudal system was abolished; encouragement was given to agriculture, industry, and science; civil and criminal laws were reduced to a code; and the army received an entirely new organization, which greatly increased its efficiency; but these measures were mingled with many others hostile

to national liberty. On the accession of Pope Pius IX. in 1846 Charles Albert seemed to return to his former inclinations, granted a constitution to Sardinia, created a civic guard, amnestied the exiles of 1821, and granted more liberty to the press. On the outbreak of the revolution of 1848 he presented himself as the champion of Italian independence, and at once aided with his arms the insurgents in Lombardy and the duchies of Parma, Piacenza, and Modena, refusing French offers of aid with the words, *L'Italia farà da sé* ("Italy will help herself"). He fought successfully at first, defeating the Austrians at Pastrengo, April 30, 1848; Goito, May 29; and reducing Pizzighettone and Peschiera. But, ill supported by the Lombard troops, he was in his turn worsted at Custoza, July 25, by Marshal Radetzky, who had taken Vicenza, Treviso, and Padua, obliged to hastily retreat to and from Milan, and had to sue for an armistice, through which he lost all his former advantages. On the expiration of the truce, relying on the simultaneous operations of the Hungarians against the Austrians, he resumed hostilities; but his army, under Gen. Chrzanowski, was completely destroyed at Novara, March 23, 1849, and the hopes which Italy had placed in him were entirely lost. He then resigned the crown to his elder son, Victor Emanuel II., and retired to Oporto, where he died four months later.

VI. SAVOY.

CHARLES EMANUEL I., the Great, duke of Savoy, born at the castle of Rivoli, Jan. 12, 1562, died at Savillan, July 26, 1630. He succeeded his father, Philibert Emanuel, surnamed Ironhead, in 1580. His bold and enterprising spirit soon embroiled him in the wars of his time, and he successively entered into alliances with Spain, France, and the emperor of Germany, which he broke, however, as soon as it suited his interests. But he was possessed of remarkable talent, even of great scientific accomplishments, and distinguished himself by his courage in many a battle. In 1585 he married Catharine, the daughter of Philip II. of Spain. This connection, and some pretensions to the throne of France after the death of Henry III., made him the enemy of Henry IV., who had still to conquer his kingdom. Involved in war with Henry for the marquisate of Saluzzo, and with the Swiss cantons of Geneva and Bern, he was compelled by a defeat at St. Joire (October, 1589) to an unprofitable peace; but he soon recommenced hostilities in alliance with the Catholic league, penetrated into Provence, occupied Barcelonette, Antibes, and Fréjus, and entered Aix as victor (November, 1590). This was but the commencement of a long war, which was carried on with varied success, and after a series of victories and defeats was terminated by the peace of Lyons (1601), which gave Saluzzo to Charles Emanuel in exchange for some small frontier districts ceded to France. He then made a sudden attack on

Geneva, but the enterprise failed; many of his soldiers were killed, others hanged as robbers. Afraid of the growing influence of Spain in Italy, he entered into alliance with France and Venice; but after the assassination of Henry IV. (1610), France concluded peace with Spain, abandoning the duke of Savoy. He then sought the alliance of the house of Hapsburg, and after the extinction of the ducal line of Mantua laid claims to Montferrat (1612). After the death of the emperor Matthias (1619), he became a candidate for the crown of Germany, but was beaten by Ferdinand II. Restless in his ambition (which also led him into schemes of conquest in Cyprus and Macedonia), he attacked Genoa (1624), and finally brought upon himself the enmity of all his former allies. The French occupied Pignerol, threatened Turin, and finally conquered Savoy. Broken by these disasters, the old Charles Emanuel died suddenly.

VII. SPAIN.

CHARLES I. See CHARLES V., Germany.

CHARLES II., king of Spain, son of Philip IV. and Marianna of Austria, born Nov. 6, 1661, died Nov. 1, 1700. Philip, dying when his son was but four years old, left the kingdom under the government of the queen and a council appointed by her. She chose for it men attached to her interests and holding her views, making her confessor, the grand inquisitor Neidhard, one of its leaders, but excluding both from this and all other important offices the second Don John of Austria, illegitimate son of Philip IV. Don John, whose military services had been of the greatest value to the Spanish throne, resented this neglect; and, assisted by the people, with whom his cause was popular, he marched with the army under his command against Madrid. The queen was compelled to dismiss Neidhard, to appoint John to the viceroyalty of Aragon, and to consent to several important concessions. In 1672 war with France added its evils to these internal disturbances; in 1674 Sicily was lost; and the Spanish kingdom was now brought by misgovernment to the worst condition it had known for many years. This moment Charles seized to make himself independent of the restraints of the regency; and in 1675, when barely 14 years of age, he assumed the control of affairs. Two years later he obliged his mother to retire to a convent, and made Don John his chief councillor. So long as the latter lived a great improvement was perceptible, and the affairs of the kingdom were skilfully conducted. In 1678 the treaty of Nimeguen was concluded with France; and although its terms were extremely hard, requiring the cession of Franche-Comté and several important towns in the Netherlands, it was only through the ability of Don John that Spain secured peace even on such conditions. On the conclusion of this treaty Charles received in marriage the niece of Louis XIV., Louisa, daughter of the duke of Orleans.

But Don John had barely brought the affairs of the kingdom into a tolerable condition when his death, Sept. 17, 1679, left them to fall into a worse state than before. Charles gave himself up to every kind of frivolity, paid little attention to the interests of the state, and allowed the conduct of the government to pass into the hands of unworthy favorites; his mother, returning from her retirement, regained much of her authority, and used it without scruple. In 1689 Queen Louisa, the only one who had exerted a good influence over the king, died; and the only strong opposing element in the king's conduct being thus taken away, he was left to advisers in the interests of Austria, who for the next few years ruled in such a way as to make Spain little more than a dependency of that empire. In 1690 Charles married Anna, widow of the elector palatine, and sister of the emperor of Germany; and thus became more than ever devoted to the party in European politics of which his council were already the allies. Even before the death of Louisa he had joined a coalition against Louis XIV., whose armies were threatening the Netherlands. But instead of his driving back the French in the north, they invaded his kingdom in 1694, and penetrated to Barcelona before the peace of Ryswick put an end to the war (1697). Charles, though twice married, was still without children; and, obliged to abandon the hope of direct descendants, he began to devote himself to the question of the succession to the Spanish throne. The complicated intrigues having their motive in the desire to gain this for one or another of the claimants (see CHARLES VI., Germany) occupied the last five years of his life, and ended, so far as he was concerned, in his making his will in favor of Philip of Anjou, who succeeded him under the title of Philip V.

CHARLES III., king of Spain and of the Two Sicilies, second son of Philip V. and Elizabeth Farnese, born Jan. 20, 1716, died Dec. 13, 1788. Since his elder brother Ferdinand would by right succeed to the Spanish throne, Charles's ambitious mother began almost at his birth to make schemes for gaining for him a separate kingdom; and it was through her efforts that the emperor Charles VI. was forced to grant, among the first concessions he made to secure Spain's consent to the pragmatic sanction, the possession of the duchies of Parma and Piacenza in Italy. To these duchies was to be added Tuscany so soon as the extinction of the line of the Medici, the last of whose race now ruled over it, should leave its throne vacant. This happened before Charles was 14 years old; and in 1731 his father sent him to the Spanish army in Italy, to occupy his new possessions. In 1734, during the war excited by the question of the Polish election (see CHARLES VI., Germany), he led the Spanish troops into Naples and subdued that country; he conquered Sicily also, and the emperor Charles VI. was compelled to confirm him in his

possession of both kingdoms, under the title of king of the Two Sicilies, before Spain would consent to give its full assent to the Austrian plan of succession, the recognition of which it was the aim of nearly all Charles VI.'s later treaties to secure. The first years of his reign, during the continuance of war, were occupied only with the defence of his kingdom; but on the return of peace he turned his attention to its internal administration, and governed with much wisdom and skill. In 1759 his brother Ferdinand VI. died, and Charles succeeded to the Spanish throne. He now conferred the kingdom of the Two Sicilies on his third son, Ferdinand, decreeing at the same time that it should not henceforth be united with Spain. In Spain Charles gratified the hopes excited by his excellent rule in Naples and Sicily. He undertook extensive reforms in the administration of the finances; introduced, in spite of the opposition of the clergy, many liberal provisions into the laws relating to education and religious administration; restricted the power of the inquisition, and put an end to the interference of the Jesuits in political affairs, finally banishing them from the kingdom (see ARANDA); reëstablished the coinage on the former basis; encouraged the institution of a bank at Madrid; and established societies for the promotion of the arts and sciences. In the war which ended with the recognition of American independence, Spain took part against England, but with small success. An attempt against Algiers also attained but slight results; and Charles's reign is rather remembered for its internal improvements than for its foreign policy.

CHARLES IV., king of Spain, born in Naples, Nov. 12, 1748, died in Rome, Jan. 19, 1819. The son of Charles III., he succeeded to the throne in 1788, having married at an early age his cousin, Maria Louisa of Parma, by whom he was entirely controlled. When Manuel Godoy, a handsome private in the body guards, became her lover, she contrived to make him the friend of her husband; and she succeeded so well that they lived together on the most intimate terms, the favorite of the queen becoming also the favorite of the king. He was always ready to confer new favors upon Godoy; raised him very rapidly to the rank of a lieutenant general, and bestowed upon him the title of duke of Alcudia and the office of minister of foreign affairs. Complications arose with the French republic, owing to the efforts of Charles to save the life of his cousin, Louis XVI., whose execution he resented by declaring war against France. His army, however, was soon worsted, and he was happy to conclude in 1795 a treaty of peace at Basel. This treaty was signed by Godoy, who then assumed the title of "Prince of the Peace." In consequence of this alliance with France, Charles became involved in a war with Portugal and England. The hostilities against the former country did not last long, nor were they severe; but in the contest with the lat-

ter, the Spanish navy received a deadly blow at the battle of Trafalgar (Oct. 21, 1805). Napoleon, who found a pliant tool in Godoy, finally resolved on deposing Charles IV., who also had an enemy in his own son Ferdinand. The young prince, whose bad qualities were still unknown to the nation, gained universal favor by his opposition to Godoy and the French rule, and used his influence to annoy his father. Charles, disgusted with his son's conduct, and tired of the French domination, resolved to retire to Spanish America; but on the very day he intended leaving his royal residence at Aranjuez, March 18, 1808, he was stopped by a tumult of the populace instigated by Ferdinand. The rage of the people was now directed against the queen and Godoy. In order to save Godoy's life, Charles abdicated (March 19) in favor of Ferdinand, but a few days later sought to withdraw the abdication. Napoleon put an end to the feud between father and son by deposing them both. Charles and Ferdinand were taken to Bayonne, where Napoleon was to pronounce between them as an umpire. As soon as the emperor got them in his power, he obliged Ferdinand to restore the crown to his father, who in turn relinquished it to Napoleon. This episode was the turning point of the fortunes of Napoleon. Charles received in exchange for his crown the castle of Compiègne, surrounded by a forest abounding in game, with a yearly pension of 6,000,000 francs. Notwithstanding the allurements of Compiègne, Charles went to Marseilles; and in 1811 he was permitted to repair to Rome, in company with his wife and Godoy. After the fall of Napoleon, Ferdinand having given dissatisfaction to the Spaniards, a proposition was made to Charles to renew his claims to the crown; but he refused, his only desire being to spend his latter years in retirement in the company of his wife and her paramour. The former having died in December, 1818, grief preyed so much upon his mind that he died within a month afterward.

VIII. SWEDEN.

CHARLES IX., king of Sweden, fourth son of Gustavus Vasa, born in 1550, died Oct. 30, 1611. Eric XIV., successor of Gustavus, excited the dislike of the people, and his brothers John and Charles united against him; he was deposed, and succeeded by John, who died in 1592. His legal successor was his son Sigismund, who had been elected king of Poland, being the son of a princess of the house of Jagiello. Sigismund being a Catholic, and bitterly hostile to Lutheranism, which had been introduced into Sweden by Gustavus Vasa, Charles, by the consent of the senate, assumed the government, and a decree was passed that Lutheranism should be the only religion of Sweden, and that Sigismund should not be recognized as king until he had signed the decree. This he did, and was crowned in 1593, but he became obnoxious on account of the favor which

he manifested to Catholicism. There was also a party, led by Charles, opposed to a union of the crowns of Poland and Sweden. A war ensued. Sigismund was defeated, and resigned the crown of Sweden in favor of his young son Ladislas, who was sent to Sweden to be educated as a Protestant, under the eye of Charles, who was appointed regent. After a while Sigismund renewed his pretensions, and was opposed by Charles, to whom the crown of Sweden was offered. This he at first declined, and made propositions to Sigismund, which were rejected, and the war broke out afresh. At length the states again offered the crown to Charles, making the succession hereditary in his family. He accepted, and the coronation took place in 1604. Charles carried the war into Poland, but there had little success. He also became involved in hostilities with Russia, where his general, De la Gardie, gained important advantages. This alarmed Christian IV. of Denmark, who declared war against Sweden, and captured several strong places. Charles, in spite of his age and infirmities, challenged Christian to mortal combat, which was contemptuously declined. Charles died soon after, leaving the war with Denmark and Russia to his son Gustavus Adolphus. Charles IX. was a monarch of considerable ability, though harsh and cruel in character. He instituted a new code of laws, founded several cities, established the university of Gothenburg, and in other ways did much to promote education. He wrote a rhymed chronicle of Sweden, which is often quoted by historians. His letters to Henry IV. of France, the elector palatine, and the landgrave of Hesse, on the means of making peace with Sigismund III. of Poland, have been published in German (4to, Amsterdam, 1608).

CHARLES X., Gustavus, born at Nyköping, Nov. 8, 1622, died at Gothenburg, Feb. 13, 1660. He was the son of John Casimir, prince palatine of Deux-Ponts, and of Catharine, daughter of Charles IX. and sister of Gustavus Adolphus of Sweden. He was carefully educated at the university of Upsal, and afterward travelled in Germany, France, and Switzerland. Gustavus Adolphus, falling at the battle of Lützen (1632), left his kingdom to his infant daughter Christina. The Swedes, however, still carried on the thirty years' war in Germany, and Prince Charles in 1642 entered the Swedish army, and served with distinction under Torstenson. In 1648 he was appointed generalissimo of the Swedish forces in Germany. But the war having in that year been ended by the treaty of Westphalia, Charles returned to Sweden, where he was received with great favor, and was declared heir apparent to the crown. He became enamored of his erratic cousin Queen Christina, who however made light of his attachment, and refused to marry him, but in 1654 abdicated in his favor, and Charles was crowned June 16. He found his kingdom in great disorder. Most of the revenue was absorbed by the pension set-

tled upon Christina, and the interval of peace had impaired the military spirit of the nation. John Casimir, king of Poland, son of that Sigismund who had been set aside in Sweden in favor of Charles IX., made pretensions to the Swedish crown. Charles thereupon invaded Poland, gained several victories, captured Warsaw and Cracow, and in three months made himself master of all Poland, John Casimir taking refuge in Silesia. Frederick William, elector of Brandenburg, had made incursions into ducal Prussia, which gave umbrage to Charles, who marched against him, and compelled him to acknowledge himself a vassal of Sweden. The rapid success of the Swedes alarmed all Europe, and John Casimir, assured of support, renewed the war. In the depth of winter Charles marched again into Poland, gained a great victory over Czarniecki, and then moved upon Dantzic. The Poles rallied, and, aided by the Tartars, recaptured Warsaw, whither Charles and the elector of Brandenburg marched; and in July, 1656, a battle lasting three days was fought near that city, in which the Swedes were finally victorious. Charles rewarded the services of Frederick William by recognizing him as independent sovereign of Prussia. France, England, and Austria grew jealous of Sweden, the czar Alexis made some hostile movements, and Frederick III. of Denmark declared war against her, and invaded the duchy of Bremen. Charles, leaving a small force in Poland, marched into Holstein, sending Wrangel with another corps to Bremen, and the Swedes gained considerable successes in both directions; but a naval battle, lasting two days, was fought with no decisive result. Charles was now without a single ally. Poland was in full insurrection; Russia, Austria, and Denmark were in arms; Turkey showed signs of hostility; and the elector of Brandenburg declared against Sweden. Charles resolved upon a sudden blow against Denmark, his nearest enemy. In January, 1658, at the head of 20,000 men, he appeared upon the shore of the Little Belt, which was now frozen over. He crossed upon the ice to the island of Fünen, where he cut to pieces a Danish force of 4,500, and then advanced to Langland, Laaland, Falster, and finally to Seeland. The Danes were struck with terror at this unexpected invasion, and gladly accepted the terms offered by Charles, giving up some important places on the Belt. Charles also made peace with the Russians, ceding to them several conquests which they had made. In 1659 the king of Denmark began to show signs of hostile purposes, and Charles resolved to anticipate his overt action. He suddenly appeared with his fleet before Copenhagen. A vigorous assault by the Swedes was repulsed, and a blockade was thereupon established; but the Dutch were unwilling that either Sweden or Denmark should have entire control of the northern waters, and the Dutch fleets supplied provisions to the besieged capital. Charles went back to

Sweden to raise fresh subsidies; but while engaged in strengthening his armies and fleets, he died suddenly of fever.—Charles X. was a ruler of great ability and unbounded ambition. He aspired to the sovereignty of the north of Europe. He purposed to extend the boundaries of Sweden from the gulf of Finland and Bothnia to the North sea; and according to the reports of the French ambassador, he cherished designs still more vast: when he had made himself master of the north, he would, like a second Alaric, descend upon Italy with a great army and navy, and bring Rome again under the power of the Goths. His life has been written by Pufendorf, *De Rebus a Carolo Gustavo gestis* (2 vols., Nuremberg, 1696); and in Swedish by Lundblad, who also translated the work into French (1825). He was succeeded by his infant son Charles XI. (born in 1655, died in 1697).

CHARLES XII., born in Stockholm, June 27, 1682, killed at the siege of the fortress of Frederikshald, Norway, Dec. 11, 1718. He was the eldest son of Charles XI. (1660–1697), a peaceful prince, who improved the internal condition of his kingdom, opened the succession to females, and left the crown with a full treasury to his son. Charles was well educated under the care of his father, and early acquired great facility in speaking French, German, and Latin; he had also a more than ordinary knowledge of history, geography, and mathematics, especially of the latter science; and it is said that his favorite work was Quintus Curtius's account of the victories of Alexander the Great, whose career his own so much resembled. He was but 15 years old when he was declared by the estates to have attained his majority, and succeeded to the throne (1697). At first he showed little inclination or aptitude for business, devoting himself mainly to bear hunting. But before he had been two years on the throne a league between Russia, Denmark, Saxony, and Poland was brought about by Patkul, a Livonian noble, who had been ill-used by Charles XI., and, flying to the Russians, had been condemned to death *in contumaciam*. Peter I. of Russia sent Patkul as his ambassador to Augustus of Saxony and Poland, and, taking advantage of the quarrel of Sweden with Livonia, occupied the shores of the gulf of Finland. Denmark had also been rendered hostile by the annexation of Schleswig-Holstein to Sweden, and the Danish troops invaded the territories of Frederick, duke of Holstein-Gottorp, who had married Hedwig Sophia, the sister of Charles. Frederick repaired to Stockholm to demand the aid of Charles, who entered fully into the enterprise, obtained by the treaty of the Hague the aid of England and Holland, and assumed the initiative with great energy. In May, 1700, he embarked at Carlserona for the island of Zealand, designing to attack Copenhagen with a fleet of 30 ships of the line, besides transports, assisted by a Dutch and English squad-

ron. In his first engagement Charles gave evidence of the impetuous courage for which he was afterward distinguished; for, on nearing the place of disembarkation, he leaped into the sea, and was the first man on the enemy's soil. Copenhagen was bombarded by the fleets, and would have been invested and closely besieged, when further operations were terminated by negotiations, which had for their result the signing of a separate peace at Travendal (Aug. 8, 1700), Frederick IV. of Denmark deserting the coalition, and resigning Schleswig-Holstein to the house of Gottorp. In the mean time a Polish army had overrun Swedish Livonia, and laid siege to Riga, while Peter of Russia besieged Narva. The sword which Charles now drew was never again to be sheathed. From this time forth he affected the habits of an old campaigner; wine was banished from his board; coarse bread was often his only food, and he not unfrequently slept on the ground, wrapped in his heavy cloak. His dress, too, at a period when men of gentle birth paid the greatest attention to their apparel, and especially to the hair, was affectedly coarse and ultra-military. Without awaiting reinforcements, or losing any time, in the depth of winter he proceeded by forced marches across Livonia into Esthonia, where he attacked the Russian besieging army before Narva, with but 8,500 men against 50,000, and utterly defeated it, Nov. 30, 1700. Instead of following up his success, he turned aside to attack the Polish and Saxon armies, which were posted in a strong position on the Düna. On the first attack his men were repulsed with some loss; but rallying them in the middle of the stream, he reformed them in the channel of the river, and led them to a decisive victory. Shortly after this Augustus sent his mistress, Aurora von Königsmark, reputed the most beautiful woman in Europe, in the hope of entangling him in some intrigue; but Charles refused to see her. Another army was brought against him under the Saxon general Riese; but in vain, for Charles was everywhere victorious. At Kliszów, July 19, 1702, he gained another victory, which would have been decisive had not Charles been detained by a broken leg at Cracow, which delayed the campaign so much that, although he was closely pursued for four days by the Swedes under Rehnsköld, Augustus continually escaped, and afterward found a respite, owing to the invasion of Finland by the Russians, which required the whole attention of Charles till 1705. He thus wasted time in petty struggles with Poland and Saxony, allowing the young and growing colossus of the north to recuperate itself at its leisure, when he might have crushed the embryo power which in the end crushed himself. At this time, however, his thoughts seem to have been solely fixed on placing another king on the throne of Poland, young Sobieski having been surprised by Augustus at Ohlau in Silesia and carried into Saxony. Stanislas Leszcynski was

therefore elected king by the partisans of Sweden and Poland; and, although Rehnsköld was at first held in check by the manœuvring of Von Schulenburg, whose retreat across the Oder is famous in the annals of war, yet on his advancing to aid the czar, whom Charles was driving out of Lithuania, he was completely routed at Fraustadt (February, 1706) by his former opponent; in consequence of which defeat Augustus fell back upon Russia, and Charles, dashing rapidly across Silesia into Saxony, was there received with enthusiasm. This bold step so terrified Augustus that he sent his two principal councillors from Poland, with full powers to treat with Charles; but when the treaty had actually been signed, having been compelled during the progress of secret negotiations to assist his Russian ally at Kalisz, where Peter was victorious, he was so much elated that he declared the report that peace had been concluded between himself and Charles false in every particular. The declaration did nothing, however, to eject Charles from Saxony, of which he kept absolute possession, and in which Augustus was held in contempt and detestation. The Saxon was soon compelled to lower his pretensions, and to meet Charles in conference at Altranstädt, where peace was definitely concluded (Sept. 24, 1706). By it Augustus resigned all claims to the throne of Poland, and surrendered to the conqueror young Sobieski and the unhappy Patkul, against whom the vengeance of Charles was particularly excited, and whom he caused to be broken on the wheel. Charles now took up his residence in Saxony, and acted as though he was its sovereign, recruiting his armies from its subjects, and compelling the emperor Joseph I. of Germany, who had dispossessed his Protestant subjects of 125 churches, which had been given up to the Jesuits, to restore those which had been confiscated, and to permit the erection of six new ones. The emperor was at this time hard beset by his enemies in the war of Spanish succession, and the empire, if Sweden had joined the coalition against it, would have been in peril of total ruin. In order to avert this calamity, Marlborough was sent to visit the Swedish conqueror. The courtly talents of the handsome and polished Englishman were not exerted in vain. Charles was persuaded to withhold his aid from the coalition, and to turn the weight of his arms and military genius against Russia. In September, 1707, he invaded that country at the head of 43,000 men, marching almost by the very route which Napoleon followed with ten times the number of troops a little more than a century later, and shared almost identically the same fate. Charles crossed the Beresina at Borisov, and stormed the Russian lines at Golovtchin, wading the river Vabis, in which he sunk up to the neck, at the head of his forlorn hope. Thence he pursued the enemy with such inconsiderate haste and rashness that he involved himself and his army in forests and morasses.

His artillery was lost in the swamps, and his men died of hunger, while he was yet advancing. But he pressed resolutely onward, the enemy wasting the country before him. Gen. Löwenhaupt, who was attempting to join him with reinforcements from Sweden, was waylaid and defeated, after a desperate conflict which lasted during three days, by the czar in person, at Liesna; notwithstanding which, he succeeded in joining his master at the head of 6,000 men. Up to this time it had been the plan of Charles to strike direct at Moscow; but when he reached Smolensk he was persuaded by Mazeppa, the hetman of the Cossacks, to turn his line of march toward the Ukraine, where the hordes were not as yet reconciled to the Russian yoke, and where they had promised to aid him. But Peter laid waste the country, constantly retreating before him and refusing to deliver battle; and Mazeppa, who was proscribed, failed to aid him until he forced his way, with fearful loss of life from cold, hunger, and fatigue, in the depth of the winter 1708-'9, as far as Gadatch upon the Dnieper in lat. 52°, where he retired into winter quarters with the intention of attacking Poltava, a strong town on the river Vorskla, with an abundance of all provisions and supplies of which his army was in want, in the commencement of spring. Before that time arrived, however, his forces were so fearfully reduced that Peter, who since his defeat at Narva had completely reorganized his army, resolved to fight, and appeared at the head of 70,000 men, at the moment when Charles was about to invest the city. It so happened that while reconnoitring the advance of the enemy Charles was dangerously wounded in the thigh, and was obliged to limit his exertions on the day of battle, July 8, 1709, to issuing his commands from a litter instead of directing their manœuvres himself, and charging in person at their head. All advantages, however, without counting this, were in favor of the enemy: vast superiority of numbers, better equipment, perfect condition of men and animals, and a superb artillery. There was reason enough why the Russian should win the day, and he did so completely. Charles escaped with extreme difficulty, with a handful of followers, into Turkish territory, old Mazeppa adhering faithfully to his fallen fortunes. The last salvo was fired by Prince Maximilian Emanuel of Würtemberg, who commanded a Swedish regiment. He was taken prisoner and treated with extreme distinction by the czar. The Swedish division of Löwenhaupt was overtaken and compelled to surrender on the Dnieper, and Charles, escaping to Bender on the Dniester, a strong fortress which was then in Turkish territory, where he was hospitably received and allowed to fix his residence by the Ottoman Porte, employed the whole power and energy of his mind to bring about a war between Turkey and Russia. This he succeeded in doing, and the grand vizier, taking the field in 1711

at the head of 200,000 men, shut Peter up on the Pruth; and his affairs seemed utterly ruined when his yet unacknowledged wife, afterward empress as Catharine I., bribed the grand vizier with all her jewels to allow the Russians to escape. That day was decisive of the fall of Charles and the rise of Russia. Charles, who had been greatly aggrieved that to him had not been assigned the chief command of the Turkish army, galloped impatiently into the camp, but too late to prevent the escape of the czar. Frustrated as he was and severely mortified, the king of Sweden still continued year after year, till 1713, to linger at Bender, incessantly employed in endeavoring to awaken the Turkish government to a consciousness of the danger of allowing the Russians to consolidate their rising power, and constantly hoping that he had succeeded, but ever hoping in vain. He effected the overthrow, by the intrigues of the agents whom he employed at Constantinople, of four successive grand viziers, and felt justified in his long delay by the reasonable hopes he entertained of placing himself at the head of a powerful Turkish army. In the mean time Livonia and Esthonia fell a prey to Russia, immediately after the calamity of Poltava. Riga surrendered. Courland became the property of Peter, who caused its duke to marry his niece Anna Petrovna, and then designedly and deliberately drank him to death. Pomerania was next invaded. The Saxons seized the whole of Poland on the flight of Stanislas, who, deserted by all his adherents, joined Charles in Turkey; the allied forces of Saxony and Russia made themselves masters of all Swedish Pomerania, with the exception of Stralsund and Wismar; and after the war had been carried on with the utmost cruelty, Stade, Altona, Garz, and Wolgast being burned to the ground in the dead of winter, and most of their inhabitants perishing of hunger and cold, Prussia was induced to join the anti-Swedish league by the promise of the future possession of Stettin. But about this time events took place in Turkey which nearly altered the whole state of affairs in Europe. The Russian agents having at length persuaded the sultan that the residence of Charles at Bender was dangerous to his safety, as he was plotting, they said, to attack Turkey from Poland should he succeed in establishing Stanislas on that throne, he received intimation that he must leave Bender; and on his positively refusing to do so, orders were issued to the seraskier of that place to bring him, dead or alive, to Adrianople. Refusing to submit, he barricaded his house, and, with the 200 or 300 men who composed his personal retinue, defended it until, the roof taking fire, he was forced to sally out, when his spurs becoming entangled, he fell, and was mastered and made prisoner (Feb. 12, 1713). He was removed to Demotika, near Adrianople, where, obstinate as ever, he remained ten months in bed, feigning sickness, until, becoming satisfied that he

could expect to obtain nothing from the Porte, he sent off a parting embassy to Constantinople, in order to conceal his intentions, and then taking horse, in disguise, by night, travelled through Hungary, Austria, Bavaria, the Palatinate, Westphalia, and Mecklenburg, in order to avoid the Saxons and Prussians, and reached Stralsund during a dark night (Nov. 22, 1714). The moment it was known that Charles was in the city, it was invested by a combined army of Danes, Saxons, Russians, and Prussians. It was defended by Charles with extraordinary skill and talent for nearly a year; but despairing of receiving aid from without, he was forced to abandon it, Dec. 15, 1715, when he retired to Lund in Scania, where he set himself to defend his coasts. For the remainder of his reign the war was carried on for the most part by sea, and generally to the prejudice of the Swedes, though not without Charles at times making dangerous efforts against Norway. At this time his principal friend and adviser was Baron Görtz, the minister of Holstein, who all but succeeded in breaking up the anti-Swedish league, which had just been joined by George I. of England. It was the policy of Görtz to gain over Peter the Great by any concession which might be needful, by his aid or connivance to conquer Norway, and thence, with the aid of a preconcerted Jacobite rising, to land in Scotland, and dethrone George I. in favor of the pretender. A treaty had been agreed upon by which Peter should retain his conquests on the gulf of Finland, Stanislas should be replaced on the throne of Poland, and Charles should be married to Anna Petrovna, the widow of the duke of Courland. Accident dissolved the whole scheme. A Swedish despatch fell into the hands of the Danes. Denmark dreaded the union of Russia and Sweden; Saxony saw that she would lose Poland; Hanover, that her projects upon Bremen and Verden, Prussia that hers on Stettin would fail. Frederick of Hesse would no longer be heir to the crown of Sweden; while the power of Charles by so great a marriage would swell to a height dangerous to the aspirations of the Swedish aristocracy. A small Swedish force under Armfeldt had perished from cold while crossing the mountains which separate Norway from Sweden, and another, commanded by Charles in person, was besieging the fortress of Frederikshald in the south of Norway, when he was shot through the head while standing in the trenches at night exposed to the enemy's fire. It was generally supposed that he was assassinated by an emissary of the party opposed to his projects, and the question of his death gave rise to a discussion continued for many years, and resulting in the publication of more than 200 books and pamphlets. The controversy was finally settled by an inquest held at Stockholm in 1859 by the Swedish government, when the body of Charles was examined by three eminent physicians in the presence of King Charles XV., his ministers, the royal

princes, and other persons of note. The inquest after careful investigation decided that the fatal wound was inflicted by a musket ball fired from the besieged fortress. His tomb is in the chapel opposite to that where the remains of Gustavus Adolphus are interred, in the royal mausoleum in the Ridderholms church in Stockholm. The walls are decorated with trophies of his various battles, including a standard taken with his own hands in Poland. The hat, clothes, and sword worn by him at the time of his death are preserved in the chapel. Ulrica Eleonora and her husband Frederick of Hesse succeeded him on the throne of Sweden. Görtz, for his endeavors to preserve the integrity of the kingdom, was sentenced to the block. Sweden was as fatally dismembered, in order to secure the succession of a false heir to her crown, as she could have been by the utmost spite of her enemies.—See Norberg, *Konung Carls XII. historia*; Adlerfeld, *Histoire militaire de Charles XII.*; Lundblad, *Konung Carls XII. historia* (Stockholm, 1830; German translation, Hamburg, 1835-'40); and Voltaire, *Histoire de Charles XII.*

CHARLES XIII., born Oct. 7, 1748, died Feb. 5, 1818. He was the second son of Adolphus Frederick and Louisa Ulrica, sister of Frederick the Great of Prussia. Destined from his birth to fill the high office of lord high admiral of Sweden, he received a naval education, and made several cruises in his youth. In 1765 he became president of the society of sciences at Upsal, and in 1770 commenced the tour of Europe. On the death of his father, and the accession of his brother Gustavus III. to the throne of Sweden (1771), he was recalled, and played a very important part in the revolution of 1772, by which the power of the kingdom was vested in the person of the king, with the consent of the estates. This was effected mainly by the establishment of the order of Vasa, and by the organization of clubs and committees among the young officers of the army and navy in the confidence of the king. It was agreed that the brothers of the king should superintend and commence the movement in the country, while the king himself should attend to the management of the affair in the capital. The revolution broke out by the pretended siege of Christianstad, in August, 1772, by Prince Charles, in which no one was injured; and the whole business was so admirably managed that without the spilling of a drop of blood the country was delivered from the tyranny of the nobles, and the king restored to the authority of his ancestors. Shortly after these events Prince Charles was created duke of Södermanland, and appointed governor general of Stockholm. But war soon breaking out against Russia, which persisted in fomenting dissensions in Sweden, he returned to his old profession, assumed the command of the Swedish fleets, and defeated the Russians in a naval engagement in the gulf of Finland; in reward for which he was raised to the governorship. On the murder of

Gustavus III. in 1792 he was appointed regent; in which situation, at a highly critical period, he preserved the kingdom for his nephew Gustavus in its constitutional form, kept it externally and internally at peace, and united for the protection of navigation in the northern seas with the Danes. In 1796 he resigned his power to Gustavus, who ascended the throne under the title of Gustavus IV. Adolphus. After his nephew's accession Prince Charles retired into private life, passing his time in literary and scientific pursuits, and appeared no more in public affairs until, Gustavus having become a religious fanatic, a revolution broke out in 1809, by which he was deposed and his uncle placed at the head of affairs, first as administrator of the realm, and afterward (June 6, 1809) as king of Sweden. His reign was cast in stormy times, during the career of Napoleon; but he conducted the affairs of state with such consummate ability and prudence, that while almost every other European kingdom was in some degree a sufferer from the long-protracted warfare, Sweden not only suffered no loss, but received Norway at the restoration of peace as a compensation for the loss of Finland. Charles XIII. had married in 1774 Hedwig Elizabeth Charlotte, princess of Holstein-Gottorp; but having no heir, he had adopted Prince Christian of Holstein-Sonderburg-Augustenburg as his successor; and on his dying prematurely, chose Bernadotte to succeed him (1810).

CHARLES XIV. JOHN. See BERNADOTTE.

CHARLES XV., king of Sweden and Norway, born May 3, 1826, died at Malmö, Sept. 18, 1872. He succeeded his father Oscar I., son of Bernadotte, July 8, 1859, and was crowned in Stockholm May 3, and at Dronheim, Norway, Aug. 5, 1860. The great parliamentary and many other liberal reforms were instituted in Sweden during his reign, and he was extremely popular with all classes on account of his enlightened policy as well as his personal qualities. He was an excellent sportsman and artist, an accomplished poet and writer, and author of several works. During the Franco-German war of 1870-'71, he sympathized with France, but prudently refrained from committing his state. His death was mourned in Sweden and Norway as a great public calamity. His wife Louise, a Dutch princess, died March 30, 1871. Their only child, the princess Louise, married the crown prince of Denmark, July 28, 1869. By his will he left to the state most of his artistic collection, including the portion of the paintings relating to Scandinavia; the collection of arms to be placed in the national museum, the rest to remain in the chateau of Ulriksdal. He was succeeded by his brother Oscar II.

IX. WÜRTENBERG.

CHARLES I. (KARL FRIEDRICH ALEXANDER), born March 6, 1823. He married July 13, 1846, the Russian grand duchess Olga, daughter of the emperor Nicholas, and a sister of the present czar. He succeeded to the throne

June 25, 1864, on the death of his father William I. He sided with Austria in the German war of 1866, but after the battle of Sadowa concluded a secret military treaty with Prussia, and took part on her side in the Franco-German war of 1870-'71, joining the new German empire at the close of 1870.

OTHER PRINCES.

CHARLES, archduke of Austria, third son of the emperor Leopold II., younger brother of Francis I., and uncle of Ferdinand I., born in Florence, Sept. 5, 1771, died April 30, 1847. Of weak constitution and sickly, he seemed to promise little, but was soon attracted by military subjects, and became fond of geometry and other serious studies. He was 20 years old at the time of the first war of the emperor, his brother, against France (1792). Under Hohenlohe he took part in the battle of Jemmapes against Dumouriez, and afterward commanded the van of the prince of Coburg, distinguishing himself in the engagements of Aldenhoven and Neerwinden, in which the French were defeated. Belgium having been reconquered, he was appointed its governor general, March 25, 1793. In 1794 he had a part of the Austrian command in the battles of Landrecy, Tournay, Courtray, and Fleurus, against the victorious army of Pichegru. When the Netherlands were lost, he retired for some time to Vienna to restore his impaired health. In 1796 he took the field again as field marshal of the empire, and commander-in-chief of the Austrian army on the Rhine; and his victories over Jourdan at Neumarkt, Teining, and Amberg soon compelled Moreau, who had advanced as far as Munich, to undertake his famous retreat; the French were driven over the Rhine, and only maintained in their possession the bridges of Hüningen and Kehl. Both these positions Charles attacked and took in the following winter. But while things were going on successfully in Germany under his command, the French under Bonaparte were everywhere victorious in Italy, and were rapidly advancing toward the heart of Austria; and when Charles was sent there to check their progress, the victorious young general, imitating the words of Cæsar, could say, "Hitherto I have had to combat armies without a commander; now I have to combat a commander without an army." Charles was compelled to conclude the preliminary treaty of Leoben, April 18, 1797, which was soon followed by the peace of Campo Formio. Having lived for some time in Bohemia as governor of that kingdom, he was again called to arms after the violent breaking off of the congress of Rastadt (1799), and again defeated the French under Jourdan, who had crossed the Rhine, in the battles of Ostrach and Stockach. Dissensions between him and the commanders of the allied Russian troops checked his successful operations, and after the defeat of Korsakoff by Masséna at Zürich, he had again to guard the Rhine. Bad health

compelled him in March, 1800, to resign his command to Kray, and to retire to Bohemia. He was not yet restored when he had to hasten again to the defence of the empire of his brother, which, by the admirable marches of Napoleon over the Alps and of Moreau through Germany, was brought to the brink of ruin. The armistice of Steier concluded by him with the latter was the preliminary of the peace of Lunéville (1801). His great services were now recognized by his appointment as president of the aulic council of war at Vienna, as well as by a proposition made at the diet of the German empire to reward him with a statue and the title of savior of Germany; which honors, however, he refused to accept. In 1805 he commanded the Austrian army in Italy against Masséna, but his victory at Caldiero (Oct. 29-31) was of little avail, as Napoleon after the surrender of Ulm was rapidly advancing toward Vienna. The hasty retreat of the archduke Ferdinand to Bohemia, and the battle of Austerlitz, compelled Francis to the peace of Presburg (Dec. 25). Charles was now made generalissimo of all the Austrian armies, and minister of war, with unlimited power, which he used for the reorganization of the forces of the empire and the creation of a strong reserve and militia. In 1808, after the abdication of Charles IV., king of Spain, the provinces of Catalonia and Aragon called him to the throne of Spain and India, and an English frigate was sent to carry him from Trieste, but was sent back with his thanks. In the war of 1809 he commanded in Bavaria, while his brothers John and Ferdinand led the armies in Italy and Poland; he advanced as far as Ratisbon, but Napoleon's victories at Thann, Abensberg, Landshut, Eckmühl, and Ratisbon (April 19-23) compelled him to retreat. Having, however, received new reinforcements, he checked Napoleon, who had taken Vienna, in the battle of Aspern and Essling (May 21, 22). This advantage brought little more than glory, and he was defeated at the battle of Wagram, July 5, 6, and retreated continually fighting to Znaim. An armistice, and soon after the peace of Schönbrunn, put an end to the campaign. Charles was wounded, and feeling at the same time personally mortified, he resigned on July 30 his military command and all his offices, and retired to Teschen, whence he afterward went to Vienna. After the return of Napoleon from Elba, he again served for a short time as governor of Mentz; but this was the last act of his public life. He married in 1815 Henrietta, princess of Nassau-Weilburg, and became the father of a numerous family, among whom he lived in quiet retirement. An equestrian statue of him was erected in Vienna in 1860. He is known in military literature especially by his *Grundsätze der Strategie, erläutert durch die Darstellung des Feldzugs von 1796 in Deutschland* (3 vols., Vienna, 1814), and *Geschichte des Feldzugs von 1799 in Deutschland und der Schweiz* (2 vols., 1819). In 1862 a col-

lection of his military writings was published in Vienna.

CHARLES (KARL THEODOR MAXIMILIAN AUGUST), prince of Bavaria and grand prior of the order of Malta, a German soldier, born in Munich, July 7, 1795, died Aug. 16, 1875. He was a son of King Maximilian I. by Wilhelmine Auguste of Hesse-Darmstadt. He fought against Napoleon at the battle of Hanau (1813), became a general of division, and took part in the campaign of 1814. His differences with Prince Wrede led to his retirement from 1822 till after the latter's death in 1838, when his brother King Louis I. appointed him field marshal and general inspector of the army. In the Austro-Prussian war of 1866 he was commander-in-chief of the 7th and 8th corps of the Bavarian army, which coöperated with the Austrian, after which he retired from the public service.

CHARLES I., prince of Roumania, born in Prussia, April 20, 1839. He is a son of Prince Anthony of Hohenzollern, and a brother of Prince Leopold, who was proposed for the Spanish throne in 1870, and belongs to a junior and mediatized branch of the Prussian royal family. He was educated in Dresden, entered the Prussian army in 1857, and served during the Schleswig-Holstein campaign in 1864. After Couza's downfall in 1866, and the refusal of the count of Flanders, brother of Leopold II. of Belgium, to become the ruler of Roumania, Prince Charles was elected in April to that position, with hereditary rights, by a *plébiscite* of the Roumanian people. He reached Bucharest on May 20, in disguise, in order to avoid complications with Austria, which, on the eve of war with Prussia, had protested against the elevation of a Prussian to the sovereignty of the Danubian principalities. He assumed the government on May 22, and was formally recognized on Oct. 24 by the sultan and by the other powers, who had guaranteed the treaties relating to the status of Roumania. Disgusted with the factious spirit of the opposition in the chambers, and insulting anti-Prussian manifestations during the Franco-German war, he declared in 1871 his readiness to resign, but was persuaded to desist from this determination.

CHARLES AUGUSTUS, grand duke of Saxe-Weimar-Eisenach, born Sept. 3, 1757, died June 14, 1828. Having lost his father in the first year of his life, he was very carefully educated together with his posthumous brother, Frederick Ferdinand Constantine, under the regency of his young mother, who in the first year after the death of her husband was herself still under the guardianship of her father. Upon the recommendation of Frederick the Great she appointed as their governor the count of Görtz, afterward Prussian minister, giving them as teachers Seidler and Hermann, Wieland and Knebel, while Schmid conducted the affairs of the little state through the difficulties of the seven years' war. In December, 1774, Charles Augustus together with his brother entered upon a jour-

ney to France and Switzerland, during which he made the acquaintance of Goethe, who became his friend, and afterward his minister. Having been declared reigning duke by his mother on his 18th birthday, he married Louisa, princess of Hesse-Darmstadt, and continued the liberal and reformatory government of his mother, gathering around him at Weimar a circle of distinguished men, among whom were Goethe, Herder, Wieland, and Schiller. In 1786 he took service in the Prussian army, was in the campaigns of 1792-'3 on the Rhine as volunteer, was made Prussian lieutenant general in 1797, and remained in service till after the battle of Jena (1806), when he retired to his dukedom and joined the Rhenish confederacy. His soldiers now fought for Napoleon in Tyrol, Spain, and Russia. Having gone over to the coalition in 1813, he entered the Russian service in the following year, and led an army of Saxons, Hessians, and Russians into the Netherlands. He then went to Paris, London, and Vienna, and took part in the campaign of 1815. The congress of Vienna rewarded him by enlarging his state, and erecting it into a grand duchy, besides granting him a compensation of 800,000 thalers. He was the first of the German princes to introduce the promised constitutional representation (1816), and allowed freedom to the press, until he was induced to adopt restrictive measures by the complications that followed the great gathering at the Wartburg in 1817. He died of apoplexy at Graditz, near Torgau, on his return from Berlin. Several scientific and agricultural institutions, a park, and a botanical garden are among the improvements with which he adorned his country.

CHARLES DE BLOIS, or *de Châtillon*, duke of Brittany, died in 1364. He was the nephew of Philip VI. of France, who, anxious to secure his fortune, married him to Jeanne de Penthièvre, heiress apparent to the ducal crown of Brittany. But on the death of John III., in 1341, the claim of Jeanne was disputed by John of Montfort, brother of the deceased, who asserted that Brittany could not revert to female sovereigns. Thence arose a war of 20 years' duration, in which the kings of England and of France participated, the former giving assistance to Montfort, while the latter supported Charles de Blois. His cause at first promised to be successful; his competitor died about 1345, whereupon Jeanne of Montfort came boldly forward in behalf of her young son, and displayed such courage, inspired her followers with such enthusiasm, and obtained such assistance from the chivalry of England, that fortune at last declared for her. Charles was killed in battle, and the duchy of Brittany was awarded to young Montfort.

CHARLES THE BOLD, duke of Burgundy, son of Philip the Good and Isabella of Portugal, born at Dijon, Nov. 10, 1433, killed in battle near Nancy, Jan. 5, 1477. On the day of his baptism he was created count of Charolais. In infancy

he was taken by his mother to the Netherlands, and at an early age he was confided to the care of the lord of Auxy, who found him a difficult charge. He had a violent temper and obstinate will, but remarkable application, and he acquired more learning than was common among nobles of the time. At the age of 19, in the rebellion of Ghent (1452), he distinguished himself at the battle of Gavre. He was betrothed to a daughter of Charles VII. of France, but she died, and in 1454 he married Isabella of Bourbon, who died in 1465. He was noted for marital fidelity, dislike of luxury, and love for labor and manly sports; but he shared in the pleasures of society, was a graceful dancer, good musician, and the best chess player of his time. In person he was of medium height, with a powerful frame insensible to fatigue, pleasant face, and fine voice, and he was naturally eloquent. In consequence of a quarrel with his father he retired to the Netherlands. In the so-called "war of the public weal" in France (1465) he took an active part, commanding a Burgundian contingent of 10,000 men, and greatly distinguishing himself at Montlhéry, where he was wounded. In the subsequent treaty of Conflans he compelled Louis XI. to yield to the demands of the confederates. In 1466 he compelled Liège, which had made war upon Burgundy, to accept his terms of peace, and to pay a large fine, and a subsidy for the expenses of his expedition. In July of that year he marched against Dinant, and completely destroyed it. The death of his father, June 15, 1467, made Charles, at the age of 33, duke of Burgundy. He remodelled the court, and though he lived in great splendor, he required economy and exactness in accounts. Three times a week he held a public audience in which the meanest of his subjects might approach him and be heard. His administration of justice was strictly impartial, without regard to the rank of the offender, and he tolerated no parasites or sycophants. But he was full of extravagant fancies, and his egotism was unbounded. In July, 1468, he married Margaret of York, sister of Edward IV. Immediately afterward the war with Liège was resumed, and in October he marched with 40,000 men against the place and sacked and burned it. This, in connection with his recent triumph over Louis XI. by the conditions of the treaty of Péronne, raised Charles to the highest place among sovereigns. His alliance was sought by all. In the spring of 1469 Sigismund, duke of Austria, hoping to secure him as an ally against the Swiss, conveyed to him for a consideration his possessions in Alsace. Edward IV. conferred on him the order of the garter. Charles wrote and spoke English with facility. It was one of his boasts that he was "more English than the English themselves;" and, Lancastrian by descent, he looked for the possible chance of some time inheriting the English throne. In 1470, when Warwick drove Edward IV. out of England

and forced him to take refuge in Flanders, Charles sent him funds, followers, and a fleet to enable him to return. In February, 1471, with an army of 30,000 men, he began a war with Louis XI. Amiens was besieged for weeks; then followed a truce for three months, with a renewal which was broken by Louis. Thereupon Charles put his army in motion, plundered and burned Nesle in Vermandois, and besieged Beauvais. Here he was unsuccessful, and in three weeks he broke camp for a raid through the plains of Normandy which gave him the title of "the terrible." Not a farm house was left standing; the growing crops were destroyed; a record by Charles's provost marshal states that 2,072 castles and villages were razed or burned. A year's truce followed. This closes the first period of Charles's career, in his failure to undermine the monarchy of France. The second period opens with his efforts to build up beside France a stronger power. The acquisition of Gelderland at the close of 1472 added the fifth duchy to Burgundy. The year following Charles appeared as a military reformer. He had discovered the defects of feudal forces, and began to organize a standing army. Louis had succeeded in forming a league against him, combining France, Austria, the Swiss cantons, and some of the Alsatian free towns. The result was the loss of Alsace; but whether this was owing to a popular insurrection, or, as Charles claimed, to the "conspiracy," is doubtful. The Swiss, who promised to protect Alsace, declared war against Burgundy, and in 1475 the French army invaded the territory, and Charles found himself in the centre of gathering foes. Meanwhile, months before, he had drawn up his army before Neuss; but at the end of the eleventh month he raised the siege, broke camp, and retired without a single conquest. This was in June; in July Edward of England invaded France, and Charles hastened to Calais to join him. He proposed, however, to prosecute the war in concert, but not in company, with his ally; and while Edward should be engaged elsewhere, he would sweep the French out of Lorraine. But in a few days Edward concluded a peace with Louis, which excited the contempt and anger of Charles, and induced a final separation between him and Edward. Compensation came a few months later with the surrender, Nov. 29, 1475, of Nancy to Charles, completing the conquest of Lorraine. He now began an expedition which he expected would be a final blow to all his enemies. Before entering upon his Swiss campaign, he ratified, Jan. 22, 1476, a treaty giving his only child Mary to Maximilian, son of the German emperor Frederick, thus uniting the houses of Burgundy and Hapsburg. In February Charles crossed the Jura and attacked Granson. The garrison soon surrendered, and every one of the 412 prisoners was immediately hanged. Meanwhile the Swiss cantons had been gathering. Charles, to his surprise, was attacked in his fortified camp; the

Burgundian army was put to flight (March 3); as Charles said, "Twenty thousand men turned their backs on ten thousand without drawing a sword," and the slaughter of the fugitives was frightful. But the victorious Swiss soon returned from the pursuit to plunder the camp. The spoils were enormous. Charles, with the intention of holding his court in Savoy, and dazzling the Italian powers by its splendor, had brought with him the state jewels, paraphernalia, and regalia, all of which fell into the hands of the Swiss. These spoils included three great diamonds, one of which is now in the papal tiara, another in the treasury of Vienna, and the third is believed to be the celebrated Sanci diamond owned by Prince Demidoff. The Swiss churches and arsenals still exhibit Burgundian tapestries, banners, cannon, and suits of armor as trophies of the field of Granson. The remnants of the Burgundian army gathered in camp at Lausanne, where, after long prostration by illness, Charles organized another army, with which he invested Morat. The confederates gave him battle, June 22, and completely annihilated his army. Charles's loss has been estimated at from 22,000 to 26,000 men, but by this battle he lost also Lorraine. He was now alone; his allies shrank from him, and he was looked upon as a doomed man. The pope, the emperor of Germany, and Matthias Corvinus of Hungary made a combined effort to save him by offers of mediation with the confederates; but the unconquerable pride of Charles made their efforts fruitless. He gathered an army of 20,000 men, and in September commenced a prolonged siege of Nancy, during which his army dwindled to 10,000. He was urged to withdraw from Lorraine, but stubbornly refused. He would not await an attack in his camp, but on the night of Saturday, Jan. 4, 1477, he silently marched his forces to a position half a league southeast of Nancy. On Sunday morning, after mass, the troops of René, duke of Lorraine, marched out against the Burgundians. The battle was brief. Charles fought with desperation, but was soon struck down by a Swiss halberd. In an hour the Burgundian army was destroyed. On Monday the stripped and mutilated body of the duke was found in a ditch, and was brought to Nancy, where it lay in state for five days in front of the high altar in the church of St. George, and on the following Sunday it was buried. In September, 1550, it was removed to Bruges and laid beside the remains of his daughter in the church of Notre Dame. A simple stone cross still marks the spot where the body of Charles the Bold, the last duke of Burgundy, was found in the field of Nancy.—See "History of Charles the Bold, Duke of Burgundy," by John Foster Kirk (3 vols. 8vo, Philadelphia, 1864-'8).

CHARLES EDWARD (LOUIS PHILIP CASIMIR), an English prince, called the young pretender, son of James Stuart and Clementina Sobieska,

and grandson of James II., born in Rome, Dec. 31, 1720, died there, Jan. 30, 1788. The Jacobite party saw in his birth ground for new hopes. The incapacity of the pretender, or chevalier de St. George, as exhibited in 1715-'16, and the failure of Alberoni's plan for his restoration in 1719, had well nigh driven them to despair. The birth of Charles Edward, and the high character of the race to which his mother belonged, caused a reaction in their feelings, and prolonged the struggle between the constitutionalists and the divine-right party for another generation, which was marked by desperate intrigue, and was concluded in wholesale slaughter. Charles early gave indications of talent, and of a firmness of purpose inherited from his mother, which misfortune caused to degenerate into sheer obstinacy. He was well educated by Protestant tutors, acquiring accurate knowledge of English, French, and Italian, and of the history of England. His physical education was attended to, and he was dexterous in all manly exercises. He had some taste for the fine arts and skill in music. In his 14th year he made his first campaign, serving in the Spanish army that besieged Gaeta, in the war between Spain and Austria. Though so young, he bore himself bravely. In 1737 he made the tour of Italy, and, to the annoyance of the British government, was everywhere well received. At Venice the honors due to a crowned head were accorded to him, for which the Venetian ambassador was dismissed from England. His character at this time was that of an amiable, accomplished youth, and his sweetness of disposition is frequently mentioned. From a very early period his mind dwelt upon the thought of recovering the British throne, and England and France becoming involved in the war of the Austrian succession, Charles was invited to France in 1744 to take command of an army that was to be sent to England. He went to Paris, but Louis XV. would not see him. He made a favorable impression on all persons with whom he came in contact, and particularly upon Marshal Saxe, who was to have been the real head of the invading army. That army was assembled on the channel coast, and consisted of 15,000 men. The transports were to be convoyed by 20 ships of the line and 5 frigates. The English were greatly alarmed. Their channel fleet was small, most of their ships being in the Mediterranean, where they had been sent to the assistance of the house of Austria. The prince and the marshal embarked at the close of February. This was the most favorable turn that the fortunes of the Stuarts ever took after the flight of James II. There was much discontent in England, they had a powerful party in Scotland, and the Irish Catholics looked upon them as promised deliverers. Marshal Saxe was the ablest of living soldiers, and Charles was enthusiastic and resolute. But on March 6 a great storm arose and raged for a week. Many vessels

filled with troops were lost, and the rest were forced back to France. Though Charles earnestly pressed the French government to renew the attempt, he failed; whereupon he directed his attention to private efforts, and with difficulty was prevented from sailing to Scotland in a fishing boat. In 1745, having obtained some assistance from individuals of British origin in France, he fitted out two vessels, the *Elizabeth* of 67 guns, and the *Doutelle* of 16, and placing a quantity of arms and ammunition on board of them, sailed for Scotland, accompanied by a few friends. Of money he had less than £4,000. The *Elizabeth* was brought to action by a British cruiser, and was compelled to fly. This was a serious loss, as most of the stores were in her. The *Doutelle* escaped, and after some adventures Charles landed at Moidart, July 28, where he was joined by a few persons, whose numbers were soon increased, the most prominent of the highland chiefs being Donald Cameron the younger of Lochiel. The Stuart standard was raised at Glenfinnan a few days after. His army now rapidly increased, many clans rising in his behalf. He baffled Sir John Cope, the royal general, descended upon the lowlands, entered Perth, and took possession of Edinburgh, Sept. 17. The lowlanders who joined him were not numerous. The victory of Prestonpans, won Sept. 22, in which Cope's army was annihilated by the highlanders in five minutes, raised the prestige of Charles's arms, and he was enabled to march into England at the head of 6,000 men, entering that country Nov. 8. He took Carlisle, and penetrated to Swarkstone Bridge, 6 m. beyond Derby, and 94 from London, without encountering any opposition, his superior military genius enabling him to baffle the English army under Wade. But if he met no opposition, neither was his force increased, save by a few individuals, most of whom were of the lowest rank. The English nobility at that time contained many Jacobites, and they were still more numerous among the gentry; yet they remained quiet. Discouraged by this coldness, the chiefs compelled Charles to return to Scotland, where a new army had been formed, partly composed of troops from France, and partly of native levies. Charles was bitterly opposed to this course, and the view he took showed his superiority. Had the army pressed forward, London would have fallen into its hands. On the retreat, the insurgents evinced their usual military preëminence, outmarching even their mounted enemies, and inflicting a bloody repulse upon them at Clifton. They took Glasgow after their return, and defeated the English army, commanded by Hawley, Jan. 17, at Falkirk. The duke of Cumberland was then sent to Scotland, and Charles was compelled to retreat again, much against his will. Toward the middle of April, 1746, the two armies were near to one another, and Charles planned a night attack on Cumberland, which failed because of want of due informa-

tion respecting the country. On April 16 was fought the battle of Culloden, which was as fatal to the prince's character for generalship as to the fortunes of his house. With a fatigued, starved, and diminished army he awaited the attack of the superior royal forces, the latter being well supplied with everything necessary to render them efficient. At first the action was one of artillery only, in which the highlanders suffered terribly. At length their right wing charged, swept away a large portion of the first English line, and was itself almost annihilated by the fire and bayonets of the second line. Even then the royal army would have been defeated had the Macdonalds imitated the daring bravery of the MacLeans, Frasers, MacIntoshes, Stuarts, and Camerons; but, angry because they had been placed on the left, whereas they claimed the right as theirs from the day of Bannockburn, they refused to charge, and gave the enemy victory. Culloden was the last battle fought for the fated line of the Stuarts. Charles fled, and after five months of the most romantic wanderings he escaped to France, where he was well received, the king for the first time personally welcoming him. He was a great favorite at court. Some faint show was made of renewing the attempt to invade England, but Charles refused to promise to cede Ireland to France in the event of success, and the plan fell through. He visited Madrid in 1747, and was well received. In 1748 he was expelled from France in compliance with the terms of the peace of Aix-la-Chapelle. This treatment he had brought upon himself, for the French government had sought in every way to avoid extremities, and nothing but the prince's obstinacy made violence necessary. He was also compelled to leave Avignon, and refused a home in Venice. He visited Germany, and afterward resided for some time in the duchy of Bouillon. He became a Protestant in or about 1752. He was engaged in some Jacobite conspiracies, and visited London in 1750 and in 1753. The story that he was present at the coronation of George III. is slenderly supported. He finally took up his residence in Florence. His father dying at the close of 1765, he became the legitimate king of Great Britain. This title he never assumed, but was known as the count of Albany, which designation he had borne as early as 1734. He married in 1772 the princess Louisa of Stolberg-Gedern, who was more than 30 years his junior. The only effect of this marriage was to add domestic misery to the sufferings of the prince. Alfieri was the princess's lover. She fled from her husband, and a judicial separation took place in 1783. His last years were spent at Rome, where he died on the anniversary of the execution of his great-grandfather, though most accounts place the event on the following day. He left an illegitimate daughter, who survived him but a year. He was one of those rare characters who bear prosperity better than adver-

sity. His talents were high, and no member of the Stuart family ever exhibited more practical ability. His conduct in the campaign of 1745-'6 evinced an original genius for war. He found himself in circumstances entirely new, and he adapted himself to them with all the facility of genius.—The history of Charles, and of his Scottish campaign, has been written by Walter Scott, Robert Chambers, Pichot, J. H. Jesse, Earl Stanhope, O. L. Klose, and others. There is much curious matter respecting the conduct of the Jacobites, and of the prince and his family, in the "Memoirs of Sir R. Strange, and of Andrew Lumisden," by Mr. Dennistoun, Mr. Lumisden having been private secretary to both Charles and his father. In the early years of the 19th century the interest in the history of "the young pretender" was renewed by the writings of Scott, who introduced him into two of his novels, "Waverley" and "Redgauntlet."

CHARLES, Jacques Alexandre César, a French physicist, born at Beaugency, Nov. 12, 1746, died in Paris, April 7, 1823. He was remarkable for his skill in public experiments and demonstrations; and his lecture room, in which he popularized the electrical discovery of Franklin, was attended by one of the most brilliant assemblies of Paris. Montgolfier having sent up a balloon filled with rarefied air, Charles immediately constructed the first balloon ever made capable of holding hydrogen gas, with which an aeronaut successfully ascended, Aug. 2, 1783. Charles afterward made an aërostatic voyage himself, rising to the height of 7,000 ft. He invented the megascope and other ingenious optical instruments, was a member of the academy of sciences and librarian of the institute, and had one of the most beautiful cabinets in Europe.

CHARLES CITY, a S. E. county of Virginia, bounded S. by James river, N. and E. by the Chickahominy; area, 184 sq. m.; pop. in 1870, 4,975, of whom 3,153 were colored. It was one of the eight original shires into which Virginia was divided in 1634. The chief productions in 1870 were 55,269 bushels of wheat, 111,244 of Indian corn, and 47,578 of oats. There were 355 horses, 880 milch cows, 926 other cattle, and 3,903 swine. Capital, Charles City Court House.

CHARLES MIX, a S. E. county of Dakota, having the Missouri river on its S. W. border; pop. in 1870, 152, of whom 117 were civilized Indians. The chief productions in 1870 were 8,810 bushels of Indian corn, and 1,315 of potatoes. The value of live stock was \$22,250. Capital, Greenwood.

CHARLES RIVER, a stream rising in Worcester co., Mass., and flowing through Norfolk and Middlesex counties into Boston harbor. The towns on its banks are Hopkinton, Milford, Bellingham, Franklin, Medway, Medfield, Sherburne, Dover, Dedham, Needham, Natick, Newton, Waltham, Watertown, Brighton, and

Cambridge. It affords numerous sites for mills and factories, and is navigable to Watertown, 7 m. W. of Boston. The lower part of its course is the favorite training place of the boat clubs of Harvard university. It is now (1873) proposed to draw from the upper part of this river an additional supply of water for Boston.

CHARLES'S WAIN, a name given to the constellation Ursa Major, or the Great Bear, often called also the Dipper. The literal meaning of the name is the rustie's wagon, and some fancied resemblance doubtless was the occasion of its use.

CHARLESTON, a county of South Carolina, bordering on the Atlantic, including several islands, of which the largest is Edisto; area, 1,906 sq. m.; pop. in 1870, 88,863, of whom 60,603 were colored. The Santee river bounds it on the north, and it is drained by Ashley and Cooper rivers, which unite to form the harbor of Charleston. The other chief river is the Edisto, and there are numerous inlets, including, besides Charleston harbor, the N. and S. Edisto and S. Santee, which are generally navigable by small craft. The coast is broken by several bays and protected by a stretch of sandy islands. The surface is low, level, and in some places exposed to inundation. The soil embraces every variety, from the richest alluvial mould to the most sterile sand. There are large quantities of waste land, most of it reclaimable. The famous sea island cotton is raised along the rivers and coast. Formerly indigo, tobacco, silk, and wine were extensively produced. The olive, orange, and lemon have been found to mature in the open air, though cut down by occasional severe winters. The palmetto and the pine are among the indigenous forest trees. The South Carolina railroad, which terminates at Charleston city, runs through this county, and also the Savannah and Charleston and the Northeastern railroads. A communication between the Santee and Cooper rivers has been opened by a canal 22 m. long. The chief productions in 1870 were 170,087 bushels of Indian corn, 24,110 of peas and beans, 62,984 of sweet potatoes, 5,512 bales of cotton, and 4,329,217 lbs. of rice. There were 1,044 horses, 1,220 mules and asses, 2,565 milch cows, 4,321 other cattle, 2,869 sheep, and 10,390 swine. Capital, Charleston.

CHARLESTON, a city, the capital of West Virginia and of Kanawha county, on the Kanawha river, 60 m. from its mouth and at its confluence with Elk river, 233 m. W. by N. of Richmond, and 130 m. S. by W. of Wheeling; pop. in 1870, 3,162, of whom 761 were colored. The Kanawha is 300 yards wide here, and is navigable throughout the year. The valley of this river is rich in salt, coal, iron, and timber, and Charleston is a central point for the working and shipping of these articles. In the vicinity of the city are 10 salt furnaces; more salt is made here annually than at any other point in the country except Syracuse, N. Y.

They are situated in the Kanawha Salines, beginning about 2 m. above Charleston, and extending up the river on both sides for 10 m. A great variety of coal is found in abundance, such as cannel, splint, and all kinds of bituminous coals. Locks and dams are in process of construction on Elk river in order to facilitate the transportation of the immense quantities of coal and timber that abound along its banks for over 100 m. The Chesapeake and Ohio railroad, which is designed to be one of the great through routes between the east and west, passes through Charleston. The Northern and Southern West Virginia railroad, in progress, terminates here. The state house is a capacious stone building, 138 ft. long, 56 wide, and 140 high, erected in 1870 at a cost, including land, of about \$60,000. The other state institutions are in other parts of the state. The manufacturing establishments comprise 2 iron foundries with machine works attached to each, 4 saw and planing mills, a cabinet factory, 2 factories for making staves and headings for salt and flour barrels, a pump factory, a mineral water factory, 2 large flour mills, and a woollen factory. There are a high school called the Charleston institute, a public school, a Roman Catholic seminary, and several private schools. There are 8 churches, 4 weekly newspapers, and a monthly periodical. The seat of government was removed from Wheeling to Charleston by an act of the legislature of 1869, which went into effect April 30, 1870.

CHARLESTON, the chief commercial city of South Carolina, a port of entry, and capital of Charleston co., in lat. $32^{\circ} 45' N.$, lon. $79^{\circ} 57' W.$, 100 m. S. S. E. of Columbia, the capital of the state, 82 m. N. E. of Savannah, Ga., and 455 m. S. S. W. of Washington, D. C. It stands at the confluence of the Ashley and Cooper rivers, which here unite and form a spacious harbor. These rivers run a parallel course for nearly 6 m., widening as they approach the sea, thus gradually narrowing the site of the city into a peninsula. The city is built upon low and level land, and to one approaching by water seems to rise from the sea. The harbor is a large estuary extending about 7 m. S. E. to the Atlantic, with an average width of 2 m. It is landlocked on all sides except an entrance of about a mile in width. S. of this entrance, extending along the coast, is Morris island, about 5 m. long and 3 m. wide. The width of the inner harbor at its mouth is something over a mile. The passage is defended by four fortresses. On the right hand, at the entrance, is Fort Moultrie, on Sullivan's island, occupying the site of the fort which, on June 28, 1776, beat off the British fleet of Sir Peter Parker. On the left hand, raised upon a shoal in the harbor, and directly covering the channel, is Fort Sumter. Immediately in front of the city, and but a mile from it, is Castle Pinckney, covering the crest of a mud shoal, and facing the entrance. A little S. of Pinck-

ney is Fort Ripley, a small square work, built in 1862. On the S. side of the harbor, about $1\frac{1}{2}$ m. from the city, are the ruins of Fort Johnson. The outer harbor, lying within the bar, extends from Sullivan's island to the south channel, below the lighthouse, a distance of 6 m. The bar consists of successive ranges of sand banks, which stretch away before the entrance for several leagues; and as these ranges consist in part of quicksand, they are liable, from storms and undercurrents, to occasional change of locality, greatly increasing the difficulty of pilotage. Between these successive ranges of sand are formed several channels of varying depths of water. There are four of these channels: the ship channel, with 16 ft. water at ebb; the small or middle channel, with 14 ft.; Lawford's, or the south channel, with 10 ft.; and Maffitt's, close to the shores of Sullivan's island. The ship channel is $11\frac{1}{2}$ m. from the city, the middle $7\frac{1}{2}$, while that of Maffitt is still nearer. The approach to the coast is easy, the shoaling gradual, and with proper care and good seamanship the soundings alone would assure the mariner of safety. The lights along the coast of this district begin at Cape Roman; there is a light at Bull's, and floating lights and bell boats contribute to disarm all the dangers of the coast. The lighthouse at the entrance of Charleston harbor is on Lighthouse island, and W. of the ship channel, lat. $32^{\circ} 41' 55'' N.$, lon. $79^{\circ} 52' 29'' W.$ The tower is of brick, 110 ft. high; the light is at an elevation of 133 ft. above the sea. It may be seen at a distance, in good weather, of 20 nautical miles. The beacon in front of the main light is visible at a distance of 10 nautical miles. The height of the light above the sea level is 50 ft. There are beacons also on Morris and Sullivan's islands, at Fort Sumter, Castle Pinckney, Mount Pleasant, and on the battery at White point, all within the harbor. From the entrance of the middle channel a full view of the city is obtained, guided by the spire of St. Michael's church, which bears from this point about N. $63^{\circ} W.$ The surrounding country is noted for the picturesque character of its scenery. Rice and cotton fields, oaks, magnolias, myrtles, and jasmines abound in profusion. On Sullivan's island are many cottages owned by the wealthy citizens of Charleston and vicinity, and occupied by them during the summer. The mean annual temperature at Charleston in 1872 was 65.5° ; total rainfall, 58.83 inches; prevailing wind, southwest. The mean temperature in January was 45° , February 48.5° , March 51° , April 65.6° , May 74.9° , June 79.7° , July 84.1° , August 81.8° , September 77.8° , October 69° , November 59° , December 49° .—The population in 1800 was 18,711; 1810, 24,711; 1820, 24,780; 1830, 30,289; 1840, 29,261; 1850, 42,985; 1860, 40,519, of whom 17,146 were colored; 1870, 48,956, of whom 22,749 were colored. Only 4,892 of the total population in 1870 were foreigners. There were 6,861 dwellings, with an average of 7.14 persons



Charleston, from the Bay.

to each, and 9,098 families, with an average of 5.38 persons to each. There were 18,705 persons engaged in mechanical occupations, 9,949 in professional and personal services, 4,929 in manufactures and mining, 3,496 in trade and transportation, and 331 in agriculture. The corporate limits of Charleston extend from Battery or White point, on the extreme southern verge of the city, to an arbitrary line on the north, fully three miles above. The city covers a large extent of territory. The dwellings are generally isolated, having large open grounds on every side. The city is laid out with tolerable regularity. The streets, with few exceptions, cross at right angles. The two principal, King and Meeting, run N. and S., nearly parallel, the whole length of the city, but converge to intersection near the northern limits. The cross streets extend from E. to W., from Cooper to Ashley river, and are generally narrow. The principal streets are well paved and lighted with gas. The houses are mostly of brick or wood. There are few regular blocks or rows of buildings, and no uniformity; but what is lost in this respect is gained in variety, and, with fine gardens, open plats of shrubbery, shade and fruit trees, creepers, vines, the magnolia, the oak, the cedar, and the pride of India, girdling the white dwellings and the green verandahs, the effect is highly picturesque. There are few public squares, and these are generally small. The Battery is a popular promenade, lying near the water's edge and commanding an extensive view of the bay; it is surrounded by fine private residences. The principal public buildings are the orphan house, with its spacious grounds; the new custom house, which has been in process of construction for several years; the city hall, corner of Broad and Meeting streets; and the medical college and Roper hospital, in Queen street. The academy of music, corner of King and Market streets, which was converted to its present use in 1869, is one of the finest theatres in the south. It has a front of 60 ft., is 231 ft. deep, 75 ft. high, and cost \$160,000. Besides

the theatre, with accommodations for 1,200 persons, it has two large halls for concerts, lectures, and public meetings. St. Michael's church is a noted edifice, built in 1752. A fine view of the sea and the shores may be obtained from the tower, which contains a chime of bells, and can be seen far out at sea. St. Philip's church (Episcopal), in Church street, is the oldest church establishment in Charleston, but the present edifice is not quite so old as that of St. Michael's. Interred in the adjoining graveyard are the bodies of many noted persons, including Gadsden, Rutledge, and Pinckney. Here also is the tomb of John C. Calhoun, consisting of a plain granite slab supported by walls of brick and bearing the inscription "Calhoun." Just outside of the city, on the N. boundary, is the Magnolia cemetery, in which there are some fine monuments. The railroads centring in Charleston are the Savannah and Charleston, the Northeastern, extending from Charleston to Florence, and the South Carolina, extending to Augusta, Ga. There is a tri-weekly line of eight steamers running to New York, and there are two steamers each to Baltimore, Philadelphia, and Boston. There are also steamers to Savannah and Florida, and to various points on the South Carolina coast. The different parts of the city are connected by lines of street cars and omnibuses. —Charleston is the nearest of the important southern ports to the northern cities, and is the first harbor having ample room and good anchorage reached by southward-bound vessels on the long stretch from the Chesapeake. It is the principal shipping port of the state and adjacent country. For the year ending June 30, 1871, the value of imports from foreign countries was \$621,559; exports to foreign ports, \$12,387,524. Included in the exports were 5,084 bales of sea island cotton, valued at \$829,892, and 172,643 of upland cotton, valued at \$11,195,972. There entered from foreign countries 51 American vessels, 12,039 tons, and 106 foreign vessels, 36,065 tons; cleared for foreign ports, 64 American vessels, 25,813 tons,

and 120 foreign vessels, 48,726 tons; entered in the coastwise trade, 485 vessels, 347,731 tons; cleared, 430 vessels, 318,801 tons; registered, enrolled, and licensed, 160 vessels, 8,270 tons, of which 19 with a tonnage of 3,548 were steamers. During the year there were built 12 vessels of 308 tons. The total exports for the year ending Aug. 31, 1872, were valued at \$10,927,986, and the imports at \$734,471. The total number of merchant vessels belonging to the port was 152, of 6,006 tons. The most important article of export is cotton. In the extent of this trade Charleston ranks next to New York and New Orleans. Its amount for a series of years ending Aug. 31 is shown in the following statement:

YEARS.	Sea Island, bales.	Upland, bales.	Total, bales.
1866.....	5,630	102,521	108,151
1867.....	16,441	153,418	169,859
1868.....	9,352	235,713	245,065
1869.....	7,340	195,230	202,570
1870.....	12,548	236,653	349,501
1871.....	11,684	342,811	354,495
1872.....	11,789	270,565	282,154

Between a third and a half of the total exports are shipped to foreign ports, chiefly those of England and France, and the remainder to northern ports of the United States. Rice also enters largely into the commerce of the city, the exports in 1872 amounting to 42,574 tierces; 1871, 43,917; 1870, 38,688; 1869, 35,609; 1867, 22,333. In 1872, 18,460,339 ft. of lumber were shipped, 15,728,467 in 1871, 13,205,066 in 1870, and 18,558,652 in 1869. Naval stores form a leading article of commerce, the exports in 1872 amounting to 147,910 barrels. The wholesale trade of Charleston has greatly increased since the war. In 1872 the sales of dry goods amounted to \$3,000,000; boots and shoes, \$1,200,000; clothing, \$400,000; drugs and medicines, \$375,000; hats and caps, \$175,000. In 1873 Charleston had 3 national banks and 4 state banks, with an aggregate paid-up capital of \$2,930,000, and current deposits amounting to \$1,590,000; and 4 savings banks, with deposits to the amount of \$1,155,990. The manufacture of fertilizers from the valuable beds of marl and phosphate rocks in the vicinity has since 1868 been developed into one of the most important industries in the city. In 1873 there were 6 factories in and near the city, employing a capital of \$400,000. The shipments of fertilizers have advanced from 3 tons in 1867 to 27,355 tons in 1871, and 30,646 tons in the first six months of 1872. In connection with this business the manufacture of sulphuric acid is extensively carried on. Five of the establishments mentioned above have acid chambers, and from 1869 to July 1, 1872, manufactured 10,614 tons of sulphuric acid, valued at \$350,200. The exports of crude phosphate rock from Charleston and Beaufort from Jan. 1, 1867, to July 1, 1872, amounted to 206,305 tons, valued at \$1,450,000; of this amount 90,225 tons were shipped to foreign

and 116,080 tons to domestic ports. The amount consumed by local companies during this period was 36,110 tons, valued at \$250,000. According to the census of 1870, the total number of manufacturing establishments in Charleston county, which were chiefly in the city, was 224, using 54 steam engines of 1,140 horse power, and employing 2,579 hands. The capital invested amounted to \$1,538,539; wages paid during the year, \$616,962; value of materials consumed, \$1,264,731; of products, \$2,431,763. The chief establishments were 13 bakeries, 13 manufactories of carriages and wagons, 2 of fertilizers, 8 of flour, 15 of sawed lumber, 7 of machinery, 13 of tar and turpentine, and 7 establishments for ship building and repairing. Among the most important industrial establishments in Charleston are the capacious mills for removing the husk from rice and preparing the grain for market. A large proportion of the rice crop of South Carolina and Georgia is cleaned at these mills, which turn out about 30,000 tierces per annum. There are 3 of these mills, employing a capital of about \$500,000.—The city is divided into 8 wards. The government is vested in a mayor and 18 aldermen. The fire department comprises 14 engine companies, 6 having steam fire engines, and one hook and ladder company. Among the charitable institutions are an almshouse, dispensaries, the orphan house for both sexes, which usually has about 200 inmates, Shaw's orphan asylum, and the Roper hospital. The schools of the city are under the control of 8 commissioners elected by the people and a superintendent chosen by the commissioners. In 1872 the number of children of school age was 12,727, of whom 5,068 were enrolled in the public schools. There were 8 public schools (5-grammar and 3 primary), with 64 male and 4 female teachers, and 2,620 pupils in attendance, and a high school with 65 pupils. The total school expenditures amounted to \$40,453, of which \$36,813 was for teachers' wages. There are also several private schools and a school connected with the Catholic convent. Charleston college, founded in 1787, in 1872 had 5 instructors, 50 students, and a library of 8,000 volumes. The medical college of the state of South Carolina had 9 professors. The Charleston library society, founded in 1748, has 14,000 volumes, and the apprentices' library is a valuable collection. There are 3 daily, 2 tri-weekly, 2 semi-weekly, and 6 weekly newspapers, and 3 monthly periodicals. The city has a literary and a scientific society, and several social organizations. The chamber of commerce and the board of trade are influential bodies. There are 14 lodges and 6 chapters of freemasons, and 6 lodges and 5 encampments of odd fellows. The total number of churches is 39, embracing the following denominations: 10 Episcopal, of which 2 are for colored persons; 7 Methodist, of which 4 are colored; 7 Roman Catholic; 6 Presbyterian, including 1 colored; 4 Baptist, of which

2 are colored; 3 Lutheran, 1 Unitarian, and 1 Huguenot.—Charleston was originally settled about 1679, by an English colony under William Sayle, who became the first governor. He first attempted a settlement at Beaufort, but abandoned this place in consequence of its insecurity. It was too easily accessible by sea, and too difficult of defence in a period when England had several maritime competitors. Sayle transplanted his colony next to the W. side of Ashley river. After his death another removal took place, and the colonists passed over E. of the river, and planted themselves on the W. bank of the Cooper; and Oyster Point became Charleston. Its history from that period to the close of the revolution, nearly 100 years, is one of curious and remarkable interest. Charleston was one of the first among the chief places of the south to assert a common cause with and for the colonies. It was the first to assert its own independence, and to make a constitution for itself. It was thrice attempted by the enemy: first in the assault by Sir Peter Parker and Gen. Clinton on the palmetto fort (since Fort Moultrie) at Sullivan's island, in 1776, when the British fleet and army were beaten off, and almost destroyed; next by the attempted *coup de main* of Gen. Prevost, in 1779; and thirdly, in the regular investment of the city by Sir Henry Clinton, when it stood a siege of six weeks by 12,000 British regulars, and succumbed at last to overwhelming force, May 12, 1780. The city was evacuated by the British Dec. 14, 1782. Charleston was the leading city both in the nullification movement (see SOUTH CAROLINA) and in the incipient stage of southern secession. Open hostilities in the civil war began at Charleston with the bombardment of Fort Sumter by the confederates on April 12, 1861. (See FORT SUMTER.) From this time until the spring of 1865 the city remained in possession of the confederates. Early in the spring of 1863 preparations were made for a naval attack upon the fortifications in Charleston harbor; and on April 6 the federal fleet of 9 iron-clads, carrying 30 guns, commanded by Admiral Du Pont, crossed the bar and entered the harbor. The fortifications in the harbor were formidable, consisting of the forts and numerous batteries well mounted with heavy guns. Moreover, the channel between Fort Sumter and Sullivan's island was obstructed by a tight hawser buoyed up by floating casks, to which were attached torpedoes and other submarine obstacles, while impassable rows of piles had been driven in the channel between Fort Sumter and Cummings point. The attack was made on the 7th, when the gunboats were subjected to such a terrific fire from all the forts that they were soon compelled to withdraw. Morris island and the entrance to Charleston harbor having been subsequently occupied by the Union forces under Gen. Gillmore, occasional shots were directed against Charleston. Upon the surrender of Columbia, the state capital, to Gen. Sherman on Feb. 17, 1865,

Charleston was evacuated by the confederate forces, all the public buildings, stores, cotton warehouses, shipping, &c., having been fired by order of Gen. Hardee, who was in command of the city. On the 18th Charleston was occupied by the federal troops, who exerted themselves to extinguish the flames. During the war many buildings were destroyed, and the towers and steeples of churches riddled with shot and shell. Business and trade were paralyzed. Since its close rapid progress has been made in the work of rebuilding, and in every department of trade and industry. In 1872, \$473,800 was spent for new buildings and repairs in the city, besides \$177,509 for similar purposes on Sullivan's island.

CHARLESTOWN (Indian, *Mishawun*), a city of Middlesex co., Massachusetts, one of the oldest places in the state, separated from Boston on the south by Charles river. It occupies a peninsula formed by the Charles and Mystic, connecting on the northwest with the mainland at Somerville by a very narrow isthmus. Originally the territory was large, but Woburn, Stoneham, Burlington, Somerville, Malden, much of Medford, and portions of Cambridge, Arlington, and Reading have been taken from it, leaving Charlestown in extent the smallest town in the state. It is connected with Boston by the Charles river and Warren bridges, completed in 1786 and 1828 respectively, so that the two places form but one community for most social and business purposes. It is also connected with Chelsea by the Chelsea bridge, with East Cambridge by the Prison Point bridge, and with Malden by the Malden bridge. Horse cars run to Boston and the adjoining towns, and the Eastern, Fitchburg, and Boston and Maine railroads pass through the city. Since the beginning of this century the population has exhibited a steady growth. In 1800 it was 2,751; 1810, 4,959; 1820, 6,591; 1830, 8,783; 1840, 11,484; 1850, 17,216; 1860, 25,065; 1870, 28,323. Of the population in 1870, 6,924 were foreigners. The peninsula is about $1\frac{1}{4}$ m. long. The surface is very uneven, and near the centre rises into two eminences, known as Bunker and Breed's hills. The streets are generally spacious and finely shaded. The most noteworthy are Main, Bunker Hill, and Medford streets, which, starting at the S. extremity, extend the whole length of the peninsula, and joining at the neck form a broad avenue, which passes on into Somerville. These, in the upper part of the peninsula, are crossed with considerable regularity by other streets passing from the Mystic to the Charles, while the S. portion is more irregularly laid out. The city is for the most part handsomely built. Charlestown is chiefly known as the seat of the Massachusetts state prison, of a United States navy yard, and of Bunker Hill monument. The state prison is upon a low point of land, known as Prison point, at the W. extremity of the city. The walls are washed on the west and north by tide water. It was built in 1805,

but has since been much improved and enlarged, and contains 650 cells, with 14 solitary ones for punishment, a chapel, hospital, school room, workshops, storehouses, &c. This institution, which is one of the best of its kind in the country, is conducted on the congregate system, the convicts working together in shops during the day, but being separated at night. The labor is let to contractors, the prisoners being employed in shoemaking, blacksmithing, bronzing, in the manufacture of brushes, chains, iron bedsteads, spring beds, and in foundry work. There is a library of over 3,000 volumes, a Sunday school with an average attendance of over 100, and an evening school attended by 140 prisoners. The whole number of convicts in prison during the year ending Sept. 30, 1872, was 703, of whom 160 were received during the year; discharged, 122; died, 19; in prison at the end of the year, 562, of whom 382 were natives, 180 foreigners,

Hill monument, 221 ft. high, conspicuously situated on Breed's hill, itself 75 ft. above the sea, commands an extensive view of the surrounding country, and is much resorted to by visitors. (See BUNKER HILL.)—Charlestown forms a part of the Boston customs district, and is a place of considerable business. The principal manufactories are 2 of steam boilers, 3 of cabinet ware, 1 of cameras, 1 of sashes, doors, and blinds, 1 of masts and spars, 1 of pumps and blocks, 1 of shoe bindings, 1 of soap, 1 of soap stone, 1 of tables, 2 of varnish, 1 of wooden ware, 1 bookbindery, 1 brass and copper foundry, 1 brewery, 1 distillery, 4 leather-carrying establishments, 2 grist mills, 1 iron foundry, 9 establishments for dressing and coloring morocco, and 1 tannery. The Charlestown gas company has a capital of \$400,000. There are 2 national banks, with \$650,000 capital; 2 savings banks, with deposits in 1871 amounting to \$4,738,649; and 1

fire insurance company. Charlestown has been connected with the ice trade from an early period, and great numbers of vessels are annually laden with that article at its wharves. The city is divided into 3 wards. The government is vested in a mayor, a board of aldermen consisting of 3 from each ward, and a common council of 6 from each ward. The police department consists of a chief of police, a captain, a lieutenant, 31 policemen, and 14 substitutes and special policemen. The fire department is under the charge of a



Charlestown Navy Yard.

and 40 were colored; 62 were serving out a life sentence. The number of officers was 38. The total expenditure during the year amounted to \$134,560 21; the total receipts reached the sum of \$149,195 44, of which \$126,010 23 were the earnings of convicts; net income of the prison, \$14,635 23. The net income averages about \$20,000 a year. The price obtained for the labor of each convict averages 99 cents a day. The number of convicts in prison Feb. 15, 1873, was 585. The navy yard, established in 1798, is on the N. side of Charles river, at the E. extremity of the city; it is enclosed by a high wall of great strength, and covers about 60 acres. The yard contains several dwelling houses, numerous storehouses, ropewalks, machine shops, ship houses, cannon foundries, &c. The dry dock, which was opened in 1833, is 341 ft. long, 80 broad, 60 deep, and cost \$670,000. Some of the best ships of the national marine have been built at this yard. Bunker

chief engineer, 4 assistants, and a secretary. There are 2 steam engines, 5 hose companies, and a hook and ladder company. The city is supplied with water from Mystic lake in Medford, 5 m. distant. It was first introduced in 1864. Among the charities are the Charlestown poor's fund, founded by Richard Russell in 1674, and now amounting to about \$23,000, the Winchester home for aged and indigent women, and the Devens benevolent society (organized in 1819 under the name of the female benevolent society). Other institutions worthy of mention are the children's home association, the young men's Christian association, and a working men's trading association. The schools are under the charge of a board, consisting of the mayor, a secretary, treasurer, superintendent, and 6 members from each ward. They have under their management a high school, 5 grammar, 38 primary, and 3 intermediate schools, and a select school.

There are 13 male and 101 female teachers; average attendance about 5,000. The Howard grammar school house, completed in 1872, cost \$92,000. The public library was established in 1860, and contains about 15,000 volumes. There are also four circulating libraries and two weekly newspapers. The city contains 13 churches, viz.: 3 Baptist, 2 Methodist, 2 Roman Catholic, 2 Congregational, 1 Episcopal, 1 Independent, 1 Unitarian, and 1 Universalist.—Charlestown dates from 1628, though Mr. R. Frothingham, the local historian ("History of Charlestown," 1848), thinks that July 4, 1629, is the only date for the foundation of the town for which any good authority can be adduced. It is one of the most interesting spots in American history. A flourishing and noted place in the colonial period, it became conspicuous at the very commencement of the revolution, as well from political as from military circumstances. The British force that fled from Concord and Lexington fell back upon Charlestown, and Gen. Gage threatened to destroy the place if the troops were molested. Most of the inhabitants left their homes, so that on June 17, 1775, when the town was destroyed, not above a tenth part of their number were present. The resolution to fortify Bunker hill, taken by the Massachusetts committee of safety, led to the battle of that name. In the course of this battle, and as one of its incidents, Charlestown was destroyed by a discharge of shells from Copp's hill in Boston, and by men who were landed for the purpose of firing the town. The destruction was complete, with the exception of a few houses. About 400 buildings were burned, and the value of property lost was estimated at over \$500,000. In 1873 a provisional act for the incorporation of Charlestown with Boston on Jan. 1, 1874, was confirmed by the vote of its inhabitants.

CHARLESTOWN, a town of West Virginia, capital of Jefferson co., on the Winchester, Potomac, and Strasburg division of the Baltimore and Ohio railroad, about 10 m. S. W. of Harper's Ferry; pop. in 1870, 1,593, of whom 537 were colored. It is surrounded by a fertile and beautiful country. There are three or four churches, an academy, and a bank. John Brown was tried and executed here Dec. 2, 1859.

CHARLET, Nicolas Toussaint, a French artist, born in Paris in 1792, died there in 1845. His father was a poor soldier, and he received but a scanty education; but while employed in registering recruits for the municipality he laid the foundation for his remarkable knowledge of soldierly characteristics. Being a zealous Bonapartist, he lost his place in 1816. He then studied under Gros, and soon produced his first lithographic work, representing a Waterloo grenadier under the popular title, *La garde meurt, mais ne se rend pas*. Encouraged by its great success, he executed thousands of lithographic prints and drawings in water colors and sepia, with humorous, grotesque,

and graceful representations of the soldier's life, which became exceedingly popular. He struggled with adversity till about 1820, when, after his return from a visit to London with the painter Géricault, he found a more regular and lucrative market for his productions; and in the opinion of his admirers, their patriotic spirit contributed nearly as much as the songs of Béranger in paving the way for the revolution of 1830. In 1831 he was made chevalier and afterward officer of the legion of honor. At the close of 1832 he reproduced the incidents of the siege of the citadel of Antwerp from his observations on the spot. His painting, in 1836, of an "Episode in the Retreat from Russia," in the museum of Lyons, which was regarded by Alfred de Musset as a perfect poem, led the government to commission him in 1837 to paint a picture of the passage of the Rhine at Kehl by Moreau for the Versailles museum; and his "Convoy of Wounded Soldiers halting in a Ravine" is in that of Valenciennes. In 1838 he was appointed professor of design in the polytechnic school, and introduced pen drawing in place of previous methods of instruction. He also continued to produce lithographic works, including 52 renowned illustrations of *La vie civile, politique et militaire du caporal Valentin* (1838-'42), and 500 plates for Bourdin's *Mémorial de Sainte-Hélène* (1841-'2). Despite ill health he was active to the last. D. A. M. Raffet (1804-'60) and J. L. H. Bellangé (1800-'66) were among his ablest pupils. His life-long friend Col. J. F. L. de La Combe published *Charlet, sa vie, ses lettres, suivi d'une description raisonnée de son œuvre lithographique* (Paris, 1856).

CHARLEVILLE (early in the middle ages called *Arca Remorum* and *Carolopolis*), an old town of France, in the department of Ardennes, on the Meuse, about a mile N. of Mézières, with which it is connected by a suspension bridge, and 10 m. N. W. of Sedan; pop. in 1866, 11,244. It was a military station until the end of the 17th century, when its fortifications were destroyed, and subsequently the royal manufactory of arms was removed. The prosperity of the town has since increased. It has an active export trade in wine, spirits, coal, iron, and slates; a manufactory of muskets, nail works, copper founderies, and tanneries; a commodious port, a public library of 25,000 volumes, a college, an ecclesiastical school, normal school, and theatre.

CHARLEVOIX, a N. W. county of Michigan, bordering on Lake Michigan, and intersected by Green river; area, about 500 sq. m.; pop. in 1870, 1,724. Its N. W. shore is deeply indented by Little Traverse bay, and two or three considerable lakes lie wholly or partly within its boundaries. The chief productions in 1870 were 5,527 bushels of wheat, 5,155 of Indian corn, 3,251 of oats, 31,310 of potatoes, and 18,066 lbs. of maple sugar. The value of live stock was \$28,602. Capital, Charlevoix.

CHARLEVOIX, an E. county of Quebec, Canada, bounded N. E. by the river Saguenay, and S. E. by the St. Lawrence; area, 5,224 sq. m.; pop. in 1871, 15,611, all but 341 of French descent, and all but 9 Roman Catholics. It is traversed by the Laurentian mountains, and much of the rest of the surface is rugged, and some of it mountainous. The rivers Gouffre, Malbaie, Menin, Bouchard, and Noire fall into the St. Lawrence; the Petit Saguenay into the Saguenay. Numerous lakes are interspersed over the surface. Capital, Baie St. Paul.

CHARLEVOIX, Pierre François Xavier de, a French historian, critic, and traveller, born at St. Quentin, Oct. 29, 1682, died at La Flèche, Feb. 1, 1761. He entered the society of Jesus in 1698, and while a scholar he was sent to Quebec in 1705 and was employed for four years in teaching in the college at that place. On completing his divinity studies he became professor of belles-lettres in France. After publishing a history of Christianity in Japan he returned to Canada in 1720, to write his history of that province. He remained for a time at Sault St. Louis, where his room is still shown, ascended the St. Lawrence, and reaching the Mississippi by way of the Illinois, descended to New Orleans, returning to France by way of Santo Domingo, after two years' absence. In 1724 he published a life of Mother Mary of the Incarnation, first superior of the Ursulines at Quebec, and from 1733 to 1755 he was one of the directors of the *Journal de Trévoux*. He published in succession a history of Santo Domingo and a history of Japan, and in 1744 his *Histoire de la Nouvelle France*, which had been held back for nearly 20 years. With it appeared his journal while in America, addressed to the duchess de Lesdiguière, which was soon after translated into English and highly esteemed. The history, though praised and cited by historical scholars, remained untranslated till recently, when an edition in English was published at New York by J. G. Shea (6 vols., 1865-'72). His last work was a history of Paraguay (1756).

CHARLOTTE, a S. county of Virginia, bounded S. W. by Staunton river; area, 550 sq. m.; pop. in 1870, 14,513, of whom 9,613 were colored. The surface is hilly. The Atlantic, Mississippi, and Ohio railroad crosses the N. end, and the Richmond, Danville, and Piedmont road traverses the county. The chief productions in 1870 were 75,194 bushels of wheat, 194,260 of Indian corn, 118,931 of oats, and 1,964,736 lbs. of tobacco. There were 1,035 horses, 1,715 milch cows, 2,506 other cattle, 3,223 sheep, and 7,224 swine. Capital, Marysville.

CHARLOTTE, a city of North Carolina, capital of Mecklenburg co., on Sugar creek, 125 m. W. S. W. of Raleigh; pop. in 1870, 4,473, of whom 1,880 were colored. The Charlotte, Columbia, and Augusta, the Wilmington, Charlotte, and Rutherford, and the North Carolina railroads meet here. A plank road 120 m.

long connects it with Fayetteville. The city is situated upon the gold range of the Atlantic states, and its prosperity is principally owing to the working of the mines in its vicinity. A branch mint for coining gold was established here in 1838, which up to March 31, 1861, when it was closed by the civil war, produced 1,206,954 pieces, valued at \$5,048,641 50. It was reopened in 1869, and up to June 30, 1872, \$50,751 63 in unparted bars were produced. The total deposits to that date amounted to \$5,118,644 89. Under the coinage act of 1873, this establishment ceased to be operated as a mint, but is continued as an assay office. Charlotte contains several schools, churches, and cotton factories, and three banks with an aggregate capital of \$700,000. It has two daily, two tri-weekly, and four weekly newspapers, and a monthly periodical. The "Mecklenburg Declaration of Independence" was adopted here, May 31, 1775. The British troops occupied Charlotte in 1780, and for a time it was the American headquarters.

CHARLOTTE, a S. W. county of New Brunswick, Canada, bounded W. by Maine, S. W. by the St. Croix river, and S. by the bay of Fundy and Passamaquoddy bay; area, 1,323½ sq. m.; pop. in 1871, 25,882, of whom 10,703 were English in origin or descent, 10,154 Irish, and 4,319 Scotch. The town of St. Stephen is the highest point to which boats can ascend the St. Croix, which is 2 m. wide at its mouth. The county is traversed by the Western Extension, a part of the North American and European, and by the New Brunswick and Canada railways. The soil is adapted to all kinds of agricultural produce found in this latitude; but the inhabitants are largely employed in ship building, fisheries, and commerce. St. Andrews, the county town, is situated at the mouth of the St. Croix.

CHARLOTTE AMALIE, a town of the West Indies. See SAINT THOMAS.

CHARLOTTE AUGUSTA, commonly called Princess Charlotte, daughter of Queen Caroline and George IV., born at Carlton house, Jan. 7, 1796, died at Claremont, Nov. 6, 1817. At an early age she was placed under the care of the bishop of Exeter and Lady Clifford, and became one of the most accomplished princesses of her day. The prince of Orange was proposed to her as husband, but she bestowed her affections upon Prince Leopold of Saxe-Coburg, who in 1831 became king of Belgium. She married him May 2, 1816, and they took up their residence at Claremont, where she died after having been delivered of a stillborn child. Her death caused universal grief in England. It was said that by proper treatment the life of the mother at least might have been saved; and the physician who had attended her committed suicide in despair. Some of her letters, published in the "Quarterly Review," 1873, give a touching account of her unfortunate domestic life previous to her marriage.

CHARLOTTE HARBOR, or **Boca Grande**, an inlet on the W. coast of Florida, in Manatee co., about 25 m. long, and from 8 to 10 m. wide, but only 10 or 12 ft. deep. Its entrance, which lies between Boca Grande key and Gasperilla bay, is three quarters of a mile wide and 6 fathoms deep. This harbor is sheltered from the sea by islands, and produces fine oysters and a great variety of fish and wild fowl.

CHARLOTTENBURG, a town of Prussia, in the province of Brandenburg, on the left bank of the Spree, connected with Berlin by a fine promenade 4 m. long, which is lighted at night; pop. in 1871, 19,518. The place takes its name from Sophia Charlotte, the queen of Frederick I., who shortly before her death in 1705 caused a palace to be built there. The park, which is always open to the public, contains Rauch's recumbent statue of the queen, one of the finest works of modern art. Frederick the Great added a new chateau, and endowed it with a valuable gallery of art, which, especially the part which contained the paintings, was injured during the occupation of the



Royal Palace, Charlottenburg.

place by the Austrians and Russians in 1760. There are fine gardens connected with the palace. The town is a favorite resort and summer residence of the Berliners.

CHARLOTTESVILLE, a town of Virginia, capital of Albemarle co., on Moore's creek, 2 m. above its entrance into Rivanna river, and 65 m. N. W. of Richmond; pop. in 1870, 2,838, of whom 1,473 were colored. It is on the Orange, Alexandria, and Manassas, and the Chesapeake and Ohio railroads. It is the seat of the university of Virginia, an institution planned by Thomas Jefferson, founded in 1819, and whose buildings were erected at an expense of over \$200,000. (See VIRGINIA, UNIVERSITY OF.) A tri-weekly and two weekly newspapers are published here.

CHARLOTTETOWN, the capital of Prince Edward Island, in Queen's co., on the N. side of East river and on the strait of Cumberland, 42 m. N. W. of Pictou, Nova Scotia; pop. in 1871, 8,807. The site, looking toward the south, rises gently from the water. The harbor is good. The colonial building is of Nova

Scotia freestone. Among the other principal buildings are the post office, court house, market, atheneum, public hall, and normal school; the Prince of Wales, St. Dunstan, and Methodist colleges; a convent, lunatic asylum, government house, exchange, and jail. The town is lighted with gas. Here is an office of the New York, Newfoundland, and London telegraph company. Tri-weekly steamers ply during the season of navigation to Shediac and Pictou, and weekly to Georgetown, Port Selkirk, Crapaud, Mount Stewart, Port Hope, and Hawkesbury; a ferry steamer crosses the East river to Southport every hour. Communication with New Brunswick is made in winter by a small boat from Cape Traverse to Cape Tormentine, 9 m. distant. Large exports of all kinds of grain except wheat are made, to which are added potatoes, fish, and pork.

CHARLTON, a S. E. county of Georgia, bounded N. E. by the Satilla river, and separated from Florida on the S. E., S., and S. W. by St. Mary's river; area, 1,000 sq. m.; pop. in 1870, 1,897, of whom 401 were colored. Okefenokee swamp occupies the W. part. The surface is level and sandy. Tar and turpentine are manufactured. The chief productions in 1870 were 23,250 bushels of Indian corn, 3,474 of oats, 18,008 of sweet potatoes, 16,110 lbs. of rice, and 118 bales of cotton. There were 228 horses, 2,044 milch cows, 4,737 other cattle, and 6,075 swine. Capital, Trader's Hill.

CHARMA, **Antoine**, a French philosopher, born at La Charité, department of Nièvre, Jan. 15, 1801, died in Caen, Aug. 5, 1869. At the recommendation of his friend Victor Cousin, he was appointed about 1831 to the chair of philosophy at the faculty of Caen, which, despite charges of infidelity brought against him by Montalembert, he held till his death. His principal works are: *Essai sur les bases et les développements de la moralité humaine* (1834); *Leçons de philosophie sociale et de logique* (2 vols., 1838-'40); *Essai sur la philosophie orientale* (1842); and *Du Sommeil* (1851).

CHARON, in Greek mythology, son of Erebus and Night, the ferryman who transported the souls of the dead over the river Acheron to the infernal regions. The fee exacted for this service from each spirit ferried over by him was never less than one obolus, nor more than three; and to provide for this fee small coins were placed in the mouth of the dead. The spirits of those whose bodies had not been buried were not permitted to enter Charon's boat without having previously wandered on the shore for a century; nor could any living person be admitted into it till he had shown its master a golden branch, the gift of the Cumæan sibyl. The ferryman was once imprisoned for a whole year for having conveyed Hercules across in violation of this rule, even though he had been compelled by the hero to do so. Charon is generally represented as a robust old man of stern countenance, his eyes glowing like flame, his hair white and bushy,

and in his hands an oar to direct his boat on her course. The myth of Charon seems to



Charon.

have been of late invention, for he is not mentioned by any of the early Greek poets.

CHAROST, Armand Joseph de Béthune, duke de, a French philanthropist, a descendant of Sully, born at Versailles, July 1, 1728, died in Paris, Oct. 27, 1800. He devoted himself to the improvement of agriculture and of the condition of the laboring classes, emancipating the peasants on his estates, and promoting their education. His influence was extensive, and Louis XV. himself acknowledged his services. When France was exposed to invasion during the revolution, the duke, although he had little sympathy for the new government, contributed a large sum of money for the common defence. Nevertheless he was arrested and his property confiscated, but he escaped the guillotine.

CHARRAS, Jean Baptiste Adolphe, a French officer and military writer, born at Pfalzburg, in the department of Meurthe, June 7, 1810, died in Basel, Switzerland, Jan. 23, 1865. He was early imbued with republican principles, took part in the revolution of 1830, and was promoted in 1833 to the rank of lieutenant. Having written a series of able articles in the *National* on military affairs, which gave umbrage to the government, he was sent to Algeria, and distinguished himself there on the battle field as well as in the training of native troops and the colonization of the country; but owing to his unpopularity with Louis Philippe's government, he was only, after much delay, promoted to the rank of lieutenant colonel. After the revolution of 1848 he became under-secretary of state, and representative for the department of Puy-de-Dôme. He was one of the most zealous members of the national assembly, one of the chief supporters of the republican government, and one of the victims of the *coup d'état* of Dec. 2, 1851. First detained at Ham, he was transported to Belgium in January, 1852. In November, 1854, he was expelled from that country, at the request of

Napoleon III., whom Charras had denounced on many occasions, and most effectively in a letter of which 50,000 copies were printed in Belgium alone. He then sought refuge in Holland, and subsequently took up his residence in Switzerland. A pamphlet, *Les trois maréchaux de France* (Brussels, 1853), is also attributed to him. A remarkable work from his pen, *Histoire de la campagne de 1815*, in which he severely criticises the generalship of Napoleon I., appeared in 1857-'8 (2 vols.; 6th ed., 1869). His *Histoire de la guerre de 1813 en Allemagne*, unfinished at his death, appeared at Leipsic in 1866.

CHARRIÈRE, or **Charrières**, **Isabelle Agnète de Saint-Hyacinthe de**, a French authoress, born at Utrecht, Holland, about 1740, died near Neufchâtel, Switzerland, Dec. 27, 1805. She was the daughter of a Dutch baron, and married M. de Charrière, a poor Swiss gentleman who had been her brother's teacher. She published her first novel, *Lettres neuchâtelaises*, in 1784, and in 1786 appeared her most famous work, *Caliste, ou lettres écrites de Lausanne*. She visited England and France, and was an intimate friend of Benjamin Constant until the latter transferred his friendship to Mme. de Staël. She was a beautiful and brilliant woman; and Sainte-Beuve alludes in the highest terms to her genius in his *Galerie de femmes célèbres*. Owing to the loss of part of her fortune and friends, she spent the latter part of her life in great seclusion. A new edition of her *Caliste* appeared in 1845, with a notice by Sainte-Beuve, and with the latter's essay on *Benjamin Constant et Madame de Charrière*. Among her other writings are *Lettres de Mistress Henley*, a sequel to Benjamin Constant's *Mari sentimental*; *Aglionette et Insinuant*, a story; and the plays *L'Émigré*, *Le toi et le vous*, *L'Enfant gâté*, and *Comment le nomme-t-on*. Under the pseudonym of Abbé de la Tour she published *Les trois femmes*, *Sir Walter Finch et son fils William*, and other works, of which a complete edition appeared in Leipsic in 1798. Many of her works have been translated into German by her friend Ludwig Ferdinand Huber, and she wrote some of them in that language.

CHARRON, Pierre, a French author, born in Paris in 1541, died there, Nov. 16, 1603. He studied law at Orleans and Bourges, and had practised for some years as an attorney when he took holy orders, and soon became noted for his eloquence as a preacher. He filled several ecclesiastical offices in Gascony and Languedoc, was appointed chaplain of Queen Margaret of Navarre, and in 1588 returned to Paris, intending to become a monk, but was rejected on account of his age. Remaining a secular priest, he went to Bordeaux, and there became intimately acquainted with Montaigne. Charron is the author of two books widely different in their tendency and character. His *Traité des trois vérités* (1594) is a defence of religion against atheists, of Christianity against

other religions, and of Catholics against heretics. In 1601, under the tolerant rule of Henry IV., Charron published his *Traité de la sagesse* (latest edition by Duval, Paris, 1821). To this work, unjustly branded by his contemporaries as atheistic, Charron owes his place in the history of modern philosophy.

CHARTER (Gr. *χάρτης*, parchment; Lat. *charta*), the name given in the middle ages to every kind of written convention. Among the principal kinds were *chartæ juratæ* or *sacramentales*, by which an engagement was contracted with an oath; *chartæ de mundeburde*, by which kings, lords, or bishops granted their protection to corporations, churches, or monasteries; *chartæ apennes*, or *pantochartæ*, by which titles to property were confirmed; *chartæ beneficiariæ*, by which kings and emperors bestowed donations; and *chartæ partita* or *indentatæ*, which were common in England and France, and were marked with indentations or cut asunder, as English bank notes are now, in order to guard against counterfeits. The term came gradually to be limited to its modern sense, meaning an instrument by which a king or other sovereign power conferred or confirmed rights and privileges. Thus many of the early colonies in America had charters from the king of England, by which they were permitted to establish a government and make laws for their own regulation, which was therefore called a charter government. Among the charters of greatest historical importance are the *Magna Charta*, the basis of English liberty, which was signed by King John in 1215, and was frequently violated and confirmed by subsequent kings (see *MAGNA CHARTA*); the charter of peace, which Philip Augustus of France signed in 1222 at Melun, and which settled the relations between the royal officers and the officers of the bishop and chapter of Paris; the Norman charter, granted by Louis X. in 1315, to confirm the rights and privileges which Normandy had enjoyed under its ancient dukes, and which was not abolished till 1789; the

constitutional charter, which was the fundamental law of the French realm under the restoration, promulgated by Louis XVIII. in 1814, and which made all authority and executive power reside in the person of the king, and gave legislative power to two chambers; and the French charter of 1830, by which the national sovereignty was proclaimed, which was voted by the chamber of deputies, Aug. 7, 1830, and accepted by King Louis Philippe on the following day. In England corporations formerly owed their franchises to the king's charter, and the right in boroughs of sending members to parliament had or was supposed to have the same origin; but these franchises are now conferred by act of parliament.—In the United States acts of legislatures creating municipal and other corporations are commonly called charters. In the case of Dartmouth College *v.* Woodward (4 Wheaton's Reports, 518), it was decided by the supreme court of the United States that the charter of a private corporation was to be regarded as a contract, to which the state granting it was one party and the corporators the other; and consequently the provision in the constitution of the United States which forbids the states to pass laws impairing the obligation of contracts, would preclude its alteration or repeal by legislative action without the consent of the corporators. In consequence of this decision, the right to alter, amend, or repeal is usually reserved in such charters; and in some states by constitutional provision it is only subject to such right that they can be granted. The charters of public corporations, however, are at all times subject to legislative authority. (See *CORPORATION*.)

CHARTERHOUSE (Fr. *Chartreuse*, a Carthusian convent), a celebrated modern school and charitable foundation for aged soldiers and merchants in the city of London. The site it occupies was bought for a public burial place, during the great plague of 1349, by Sir Walter Mauny, who afterward established on it a con-



Charterhouse.

vent of Carthusians. After the dissolution of the religious houses by Henry VIII. it passed through several hands, till at length it was bought by Thomas Sutton, who built a hospital and endowed the present foundation. The mastership of the Charterhouse is generally filled by some distinguished scholar, and the school has the repute of being among the first classical schools of England. The establishment supports 42 boys as pupils, and 80 pensioners, who must be at least 50 years old. Each boy is educated at a certain expense, and each pensioner receives food, clothing, lodging, fire, and a stipend of money. The right of presentation to the Charterhouse is vested by rotation in the 16 governors of the hospital. Nine church livings are also in their immediate gift. Besides the scholars upon the foundation, there are usually 60 or 70 others who pay. In 1872 extensive repairs and alterations were made in the buildings.

CHARTER PARTY, the name given to a contract by which the owner of a vessel lets the whole or a part thereof to another person, called the charterer, for the conveyance of goods. The charterer either hires the vessel for a cargo to be provided by him and carried by the owner, in which case the owner will provide, victual, and pay the captain and crew; or the contract may give him possession thereof for the voyage, with the usual rights and liabilities accompanying possession. It is implied in the contract that contraband goods are not to be taken on board, thereby rendering the vessel liable to seizure.

CHARTIER, Alain, a French writer, born in Baieux toward the close of the 14th century, died probably in Avignon in or after 1449. He completed his education at the university of Paris, and was intrusted with several missions during the latter part of the reign of Charles VI., and afterward was attached to Charles VII. in various capacities. Although he had not taken holy orders, he received a prebend and archdeaconship in the cathedral of Paris. Among his principal works may be mentioned *Le livre des quatre dames*; *Le quadrilogue invectif*, a kind of colloquy between France, the people, the nobility, and the clergy; and *L'Espérance, ou consolation des trois vertus*, written in 1428. He was called by his contemporaries the father of French eloquence.

CHARTISM, a political creed in England, which takes its name from a proposed charter or bill of rights, known as the "people's charter," drawn up in 1838, the principal points of which were universal suffrage, vote by ballot, paid representatives, abolition of property qualification for representatives, annual parliaments, and equal electoral districts. These were the essential points, and are known as the six points of chartism. They had been previously advocated separately or two or more of them in conjunction; but chartism, as a distinctive political creed, took its rise in the wide-spread distress and popular disappoint-

ment that followed the adoption of the reform bill of 1832. The movement in favor of chartism was attended in many instances by popular outbreaks and riots, which were promptly suppressed by the government, and many prominent chartists were imprisoned and transported. The last disturbances occurred about the time of the French revolution of 1848, since which time chartism as an organization has gradually died out, the last public meeting having been held in 1857. Two of the six points have since been adopted: the abolition of the property qualification of members of parliament, in 1858, and the vote by ballot, in 1872.

CHARTRES, a city of France, capital of the department of Eure-et-Loire, 45 m. S. W. of Paris; pop. in 1866, 19,442. It is situated on the railroad running S. W. from Paris, and is



Cathedral of Chartres.

built on a slope at the bottom of which runs the river Eure, which divides the town into two parts, connected by a bridge planned by Vauban. Upon the site of the former fortifications are fine boulevards, and some of the modern buildings are well built; but the general appearance of the city is not prepossessing, most of the streets being narrow and crooked. The great object of interest is the cathedral of Notre Dame, commenced about 1020, and dedicated in 1260, though one of the spires was not finished till the 16th century. The principal front presents two square towers surmounted by two lofty octagonal pyramids. The old spire, of plain architecture, but cased with stone carved like the scales of a fish, is 374 ft. high. The new spire is 413 ft. high, built in the florid style. The rich portals, the painted

glass windows, the beautiful choir adorned with valuable works of art, and other remarkable features, combine to make this church one of the most magnificent in the world. It was covered with an iron roof in 1841, the old framework having been burned some years before. There are several other churches in Chartres, and among the public buildings and institutions are the residence of the prefect, three hospitals, a fine botanical garden, a museum, a library of 30,000 volumes, a departmental college and a normal school, a theatre, an agricultural society, and a charitable institution established by Dr. Aligre, whose name it bears, with accommodations for 200 aged poor and for 100 poor children. The town carries on an active trade in the products of the country, has an important wool market, and manufactories of woollen goods, hosiery, leather, and machinery. It derives its chief commercial importance from its corn market, which is the best regulated in France, and the management of whose business is intrusted to a corporation of women.—In antiquity Chartres bore the name of Autricum, but was also known as Carnutum Civitas, being the chief town of the Carnutes. In the middle ages it was the capital of the territory of Beauce, and gave its name to a county, which Francis I. raised to the dignity of a duchy. As such it was later the apanage of princes of the house of Orleans. It was often besieged and captured, among others by Henry IV. (1591), who was crowned there (1594).

CHARTRES, Robert Philippe Louis Eugène Ferdinand d'Orléans, duke de, a French prince, second son of the late duke of Orleans and grandson of Louis Philippe, born in Paris, Nov. 9, 1840. Having lost his father at the age of two, he lived with his mother, the duchess Hélène, at Eisenach, Germany, till after the revolution of Feb. 24, 1848, when he joined his relatives in England. In 1860 he accompanied his elder brother, the count de Paris, to the East, and in the following year to the United States, where they served on the staff of Gen. McClellan till July, 1862, after which they returned to England. During the Franco-German war he distinguished himself on the staff of Gen. Chanzy, under the assumed name of Robert le Fort. M. Thiers promoted him, after the abrogation of the decree of banishment of the Orleans family, to the rank of major, gave him the cross of the legion of honor, and permitted him to remain an honorary officer of the French army, in which capacity he has served in Algeria since 1872. In 1863 he married his cousin, Françoise Marie Amélie d'Orléans, eldest daughter of the prince de Joinville, by whom he has four children. He has published *Souvenirs de voyages* (1869), and an introduction to his father's posthumous *Campagnes de l'armée d'Afrique de 1835 à 1839* (1870).

CHARTREUSE, the name of various Carthusian monasteries, chiefly situated in France and Italy. The most famous institution of the

kind is La Grande Chartreuse (*Cartusia*), in the department of Isère, France, situated in a picturesque but wild and desolate region, on the summit of a steep rock at an elevation of about 4,000 ft. above the level of the sea, 14 m. N. N. E. of Grenoble. This monastery is the residence of the general of the Carthusian order. It owes its origin to St. Bruno, who repaired with six disciples to this locality in the latter part of the 11th century. It derived its name from a neighboring hamlet called Chartreuse, and it has since been called Grande Chartreuse from being the fountain-head of all other monasteries of the order. The cell which was inhabited by St. Bruno has been converted into a chapel, in which service is performed day and night. In the chapter house are the portraits of the generals of the order and a marble statue



La Grande Chartreuse.

of St. Bruno. The buildings have repeatedly been destroyed by fire; those now in use were erected in 1678. During the first French revolution the monastery was stripped of its possessions, but in 1816 it was restored to its original destination. The number of its inmates, once 300, is now 120, who depend for their support partly upon raising cattle, but mainly on the profit arising from the manufacture of the famous *liqueur* which bears the name of the monastery, where it is distilled from aromatic herbs.

CHARTULARIES, in the ancient Latin church, record books of the various monasteries, convents, and other religious and ecclesiastical foundations. Anterior to the 10th century, the pope ordered them to be kept. Their contents relate to the possessions, rents, endowments, and other temporalities of the church.—**CHARTULARY**, or **CHARTULARIUS**, is the title of the keeper of charters and public documents. He also presided in ecclesiastical courts. In

the Greek church, the word *chartophylax* is used to designate an officer of the same class, but more comprehensive functions.

CHARYBDIS AND SCYLLA, in Grecian mythology, two voracious monsters which dwelt opposite to each other, the former on the Sicilian and the latter on the Italian coast. Charybdis abode in a rock off the shore of Sicily, and thrice every day gulped down the waters of the surrounding sea, and thrice cast them up again. Scylla, whose den was in another rock on the Italian shore, was still more loathsome, having twelve feet and six long necks and mouths, each of which took a victim from every ship which passed within their reach.—In geography, Charybdis was a whirlpool on the coast of Sicily, and Scylla a rock on the coast of Italy, whose proximity rendered the navigation of the Messinian strait peculiarly dangerous to the sailors of antiquity. The rock of Scylla is still to be identified, near the town of the same name (Scilla); but the site of Charybdis has been by modern geographers transferred to the whirlpool of Galoforo, 10 m. S. of Scilla, instead of being directly opposite. There are numerous counter-currents in the strait of Messina which produce whirlpools, but none of them are now dangerous.

CHASE, an E. central county of Kansas, watered by the Neosho river and its affluents; area, 757 sq. m.; pop. in 1870, 1,975. The Atchison, Topeka, and Santa Fé railroad traverses it. The chief productions in 1870 were 47,261 bushels of wheat, 104,626 of Indian corn, 26,748 of oats, and 8,605 tons of hay. There were 1,189 horses, 1,201 milch cows, 4,730 other cattle, 1,255 sheep, and 585 swine. Capital, Cottonwood Falls.

CHASE, *Irah*, D. D., an American clergyman, born at Stratton, Vt., Oct. 5, 1793, died at Newtonville, Mass., in November, 1864. He was educated at Middlebury college and Andover theological seminary, and was ordained in 1817. After laboring as a Baptist missionary in the western part of Virginia, he became in 1818 professor in the theological school at Philadelphia, which was soon after transferred to Washington. In this office he remained seven years, one of which he spent in Europe, and in 1825 he was prominent in establishing the theological school at Newton Centre, Mass., with which he was connected as professor till 1845, when he resigned, in order to devote himself to theological and literary studies. During a visit to Europe in 1830 he aided in founding the Baptist mission in France. He published "The Life of John Bunyan," "The Design of Baptism," "The Work claiming to be the Constitution of the Holy Apostles, revised from the Greek," "Infant Baptism an Invention of Man," and many sermons, essays, and contributions to reviews on questions of church history and doctrine.

CHASE, *Philander*, an American clergyman, born in Cornish, N. H., Dec. 14, 1775, died at Jubilee college, Illinois, Sept. 20, 1852. He

graduated at Dartmouth college in 1795. His religious views at this time were those usually held by the Congregationalists, but having met with a prayer book of the Episcopal church and carefully examined its contents, he studied for the ministry in that church, and was ordained in New York in May, 1798. For several years he was occupied in missionary labors in various parts of the state of New York. In 1805, on account of his wife's health, he went to New Orleans, where he labored zealously in behalf of the Episcopal church. Returning to the north in 1811, he became rector of Christ's church, Hartford, Conn. Deeply interested in the religious condition and prospects of the great west, he went in 1817 to Ohio, and entered into the work of planting and building up the church in that state. He became bishop of Ohio Feb. 11, 1819, and prosecuted his labors amid many severe trials; but feeling the necessity of educational influence and power, he visited England in 1823 to ask for pecuniary aid toward founding a college and theological seminary in Ohio. He collected about \$30,000, and on his return purchased 8,000 acres of land and laid the foundations of Kenyon college and Gambier theological seminary. Disputes having arisen between the bishop and some of his clergy in regard to the proper use of the funds obtained from England, he resigned in September, 1831, his jurisdiction in Ohio and the headship of the college. Intent upon missionary labor, he removed further west, and in 1835 was chosen bishop of Illinois. He again visited England, and collected about \$10,000 for the same purpose as before. His labors culminated in the founding in 1838 of Jubilee college at Robin's Nest, Illinois, where he spent the remainder of his life. He was a man of more than average ability, of indomitable perseverance, and great strength of will, and was the most energetic and successful pioneer of the Episcopal church in the west. His publications are: "A Plea for the West" (1826); "The Star in the West, or Kenyon College" (1828); "Defence of Kenyon College" (1831); and "Reminiscences," an autobiography, containing the principal events in the author's life to 1847 (2 vols. 8vo, 1848).

CHASE, *Salmon Portland*, an American statesman and jurist, born in Cornish, N. H., Jan. 13, 1808, died in New York, May 7, 1873. In 1815 his father removed to Keene, and died two years later. When 12 years old he went to Worthington, Ohio, where his tuition was superintended by his uncle, Philander Chase, then bishop of Ohio. He then entered Cincinnati college, and after about a year's residence there returned to his mother's home in New Hampshire, and in 1824 entered the junior class of Dartmouth college, where he graduated in 1826. In the succeeding winter Mr. Chase opened a school for boys in Washington. In 1829 he was admitted to the bar of the District of Columbia, for which he had qualified himself while discharging the duties of a teacher.

In 1830 he returned to Cincinnati. While struggling through the early embarrassments of professional life, he prepared an edition of the statutes of Ohio, with copious annotations, and a preliminary sketch of the history of the state (3 vols. 8vo). This edition soon superseded all previous publications of the statutes, and is now received as authority in the courts. Aided by the reputation thus acquired, he soon gained a valuable practice, and in 1834 became solicitor of the bank of the United States in Cincinnati, and not long after of one of the city banks. In 1837 he acted as counsel for a colored woman claimed as a fugitive slave, and in an elaborate argument, afterward published, controverted the authority of congress to impose any duties or confer any powers in fugitive slave cases on state magistrates, and maintained that the law of 1793 relative to fugitives from service was void, because unwarranted by the constitution of the United States. The same year, in an argument before the supreme court of Ohio in defence of James G. Birney, prosecuted under a state law for harboring a negro slave, Mr. Chase asserted the doctrine that slavery was local and dependent on state law for existence and continuance, and insisted that the person alleged to have been harbored, having been brought within the territorial limits of Ohio by the individual claiming her as master, was thenceforth in fact and by right free. In 1846 he was associated with William H. Seward as defendant's counsel in the case of Van Zandt before the supreme court of the United States, and argued more elaborately the principles which he had advanced in former cases, maintaining that under the ordinance of 1787 no fugitive from service could be reclaimed from Ohio unless there had been an escape from one of the original states; that it was the clear understanding of the framers of the constitution that slavery was to be left exclusively to the disposal of the several states, without sanction or support from the national government; and that the clause in the constitution relative to persons held to service was one of compact between the states, and conferred no power of legislation on congress, and was never understood to confer any.—Prior to 1841 Mr. Chase had taken little part in politics. He had voted sometimes with the democrats, but more commonly with the whigs, who in the north seemed to him more favorable to anti-slavery views than their opponents. In 1841 he united in a call for a convention of the opponents of slavery and slavery extension, which assembled at Columbus in December. This convention organized the liberty party of Ohio, nominated a candidate for governor, and issued an address to the people written by Mr. Chase, defining its principles and purposes. In 1843 a national liberty convention assembled at Buffalo. Mr. Chase was an active member of the committee on resolutions, to which was referred a resolution proposing "to regard and treat the third clause of the constitution, whenever applied to

the case of a fugitive slave, as utterly null and void, and consequently as forming no part of the constitution of the United States, whenever we are called upon or sworn to support it." He opposed the resolution, and the committee refused to report it. It was, however, afterward moved in the convention by its author, and adopted. In 1845 Mr. Chase projected a southern and western liberty convention, designed to embrace "all who, believing that whatever is worth preserving in republicanism can be maintained only by uncompromising war against the usurpations of the slave power, and are therefore resolved to use all constitutional and honorable means to effect the extinction of slavery within their respective states, and its reduction to its constitutional limits in the United States." The convention was held in Cincinnati in June, 1845, and Mr. Chase, as chairman of the committee, prepared the address, giving a history of slavery in the United States, showing the position of the whig and democratic parties, and arguing the necessity of a political organization unequivocally committed to the denationalization of slavery and the overthrow of the slave power. In 1847 he was a member of the second national liberty convention, and opposed the making of any national nomination at that time, urging that a more general movement against slavery extension and domination was likely to grow out of the agitation of the Wilmot proviso, and the action of congress and political parties in reference to slavery. In 1848, anticipating that the conventions of the whig and democratic parties would probably refuse to take ground against the extension of slavery, he prepared a call for a free territory state convention at Columbus, which was signed by more than 3,000 voters of all political parties. The convention thus called was largely attended, and invited a national convention to meet at Buffalo in August. This convention, over which Mr. Chase presided, nominated Martin Van Buren for president, and Charles Francis Adams for vice president.—On Feb. 22, 1849, he was chosen a senator of the United States from Ohio, receiving the entire vote of the democratic members of the legislature, and of those freesoil members who favored democratic views. The democratic party of Ohio, by the resolutions of its state convention, had already declared slavery an evil. Mr. Chase, coinciding with the democrats in their general views of state policy, supported their state nominees, distinctly announcing his intention, in the event of the party's desertion of its anti-slavery position in state or national conventions, to end at once his connection with it. When the nomination of Mr. Pierce by the Baltimore convention of 1852, with a platform approving the compromise acts of 1850, and denouncing the further discussion of the slavery question, was sanctioned by the democratic party in Ohio, Mr. Chase withdrew from it, and advocated the formation of an indepen-

dent democratic party. He prepared a platform, which was substantially adopted by the convention of the independent democracy at Pittsburgh in 1852. He supported the nominees and measures of the independent democracy until the Nebraska bill gave rise to a new and powerful party, based substantially upon the ideas he had so long maintained. In March, 1850, he delivered in the senate a speech against Mr. Clay's compromise bill, reviewing thoroughly all the questions presented in it. He moved an amendment providing against the introduction of slavery in the territories to which the bill applied, but it failed by a vote of 25 to 30. He proposed also, though without success, an amendment to the fugitive slave bill, securing trial by jury to alleged fugitive slaves, and another conforming its provisions to the terms of the constitution, by excluding from its operation persons escaping from states to territories, and *vice versa*. In 1854, when the bill for the repeal of the Missouri compromise, commonly called the Nebraska-Kansas bill, was introduced, he drafted an appeal to the people against the measure, and in a speech on Feb. 3 attempted the first elaborate exposure of the features of that bill, as viewed by its opponents. In the general opposition to the Nebraska bill he took a leading part, and made an earnest protest against it on the night of its passage. Meanwhile he was constant in the discharge of the general duties of his position as senator. To divorce the federal government from all connection with slavery, to confine its action strictly within constitutional limits, to uphold the rights of individuals and of the states, to foster all the great interests of the country, and to secure an economical administration of the national finances, were the general aims which he endeavored to promote. He held that the federal treasury should defray the expense of providing for the safety of navigation on our great inland seas, as well as on the Atlantic and Pacific coasts, and urged liberal aid by the federal government to the construction of a railroad to the Pacific. He was an earnest supporter of the policy of the free homestead movement, and of cheap postage.—In July, 1855, Mr. Chase was nominated by the opponents of the Nebraska bill and the Pierce administration for governor of Ohio, and was elected. His inaugural address, delivered in 1856, recommended economy in the administration of public affairs, single districts for legislative representation, annual instead of biennial sessions of the legislature, and ample provision for the educational interests of the state. His state policy and senatorial course were now so much approved that at the national convention of the republican party, held the same year, a majority of the Ohio delegation and many delegates from other states desired his nomination for the presidency; but his name was at his request withdrawn. In 1857 he was re-elected by the largest vote that had ever been

given for a governor in Ohio. In the republican national convention at Chicago, May, 1860, Mr. Chase was proposed as a candidate for the presidency, and on the first ballot received 49 votes out of 465. In 1861 he became secretary of the treasury in President Lincoln's cabinet, and retained the position till June 30, 1864, when he resigned. The financial policy which carried the nation through the civil war was mainly the work of Mr. Chase. Its essential features were the issue of United States notes, known as greenbacks, which bore no interest, but were made legal tender; borrowing money upon bonds maturing at various dates, and bearing different rates of interest payable in gold; and the so-called national banking system, under which each bank was required to deposit in the treasury \$100 in bonds for every \$90 of notes issued by it, and which, superseding state banking systems, secured at once stability to the currency and to the national credit. A large amount of the bonds first issued bore 7·3 per cent. interest (2 cts. a day on each \$100), but the great majority were at 6 per cent. None were sold at less than par, and they generally commanded a premium. When Mr. Chase left the treasury department, the national debt amounted to \$1,740,690,489, to which it was estimated \$500,000,000 would be added in case the war continued another year. Mr. Taney, chief justice of the United States, having died in October, 1864, Mr. Chase was appointed his successor Dec. 6. In this capacity, in March, 1868, he presided at the trial of President Johnson, who had been impeached before the senate by the house of representatives. Mr. Chase had now become dissatisfied with the policy of the republican majority in congress. He was proposed in the democratic national convention held in New York in July, 1868, as a candidate of that party for the presidency. He was willing to accept the nomination upon certain conditions, and for a time it seemed probable that he would be very strongly supported; but in the actual ballots his highest vote was 4 out of 663. From that time he withdrew to a great extent from public affairs, his health having been much impaired by a paralytic stroke; but in the presidential canvass of 1872 he sided with the party opposed to the reelection of Gen. Grant as president.

CHASE, Samuel, an American jurist, and one of the signers of the declaration of independence, born in Somerset co., Maryland, April 17, 1741, died June 19, 1811. His father, an Episcopal clergyman of English birth, directed his early education, and sent him to study law at Annapolis, where he was admitted to the bar at 20 years of age. He was soon noted as a skillful and eloquent advocate and a learned lawyer. He strenuously opposed the royal governor and his adherents in the colonial legislature, was among the most vehement in resisting the stamp act, and soon became the leader of the friends of liberty in his state. The

Maryland convention sent him as one of five delegates to the continental congress of 1774, and he continued a member of successive congresses until the end of 1778. In 1776 he went with Charles and John Carroll on a mission to Canada, which he was the more ready to undertake, because the Maryland convention was inclined to half-way measures and refused to instruct its delegates to vote for the declaration of independence. On his return he canvassed the state, brought public opinion to bear on the convention, and having thus caused the passage of the desired resolution, returned to Philadelphia in season to vote for independence. He was appointed on most of the important committees in congress, where his industry was unwearied. The last two or three years of the war he spent at home in the practice of law. In 1783 he went to England as commissioner of Maryland, to recover funds invested previously to the war in the bank of England. He remained there nearly a year, and succeeded in putting the claim so far in the way of adjustment that subsequently \$650,000 was paid over to that state. In 1786 he removed to Baltimore, and in 1788 was appointed chief justice of a newly established criminal court there, and in 1791 chief justice of the general court of Maryland. Between these dates he was a member of the Maryland convention for considering the federal constitution, which he did not think sufficiently democratic. His course on the occasion of a riot in 1794 characterizes the man. He had caused the arrest of two popular men as ringleaders. They refused to give bail, and the sheriff was apprehensive of a rescue should he take them to prison. "Call out the posse comitatus, then," said the judge. "Sir," was the reply, "no one will serve." "Summon me, then; I will be the posse comitatus, I will take them to jail." Such was the state of the public mind that the grand jury, instead of presenting the rioters, presented the judge for holding a place in two courts at the same time. He simply told them that they had meddled with topics beyond their province. In 1796 Washington appointed him an associate justice of the supreme court. In 1804 the house of representatives, at the instance of John Randolph, impeached him for misdemeanor in the conduct of several political trials, particularly those of Fries and Callender, convicted of seditious libels five years before. The senate discharged him, March 5, 1805, a majority being in his favor on five of the eight charges, and a majority against him on the residue. After his discharge, he resumed his seat on the bench, which he retained until his death.

CHASLES, Michel, a French mathematician, born at Épernon, Nov. 15, 1793. After the completion of his studies in 1814 at the polytechnic school of Paris, he removed to Chartres, where he obtained a professorship in 1825. He subsequently returned to Paris, where in 1841 he was appointed professor of geodasy

and machinery in the polytechnic school, and in 1846 of superior geometry, a chair especially established for him in the faculty of sciences. In 1851 he became a member of the academy. In 1867 he reported to that body his possession of alleged autograph letters of Galileo, Pascal, and Newton, containing startling revelations, and claiming for Pascal the merit of Newton's most celebrated discoveries. These letters were part of about 27,000 which Chasles purchased from a M. Irène Lucas for 140,000 francs, including about 2,000 pretended to have been written by Rabelais, and others by Mary Stuart, Shakespeare, Dante, Petrarch, and Julius Cæsar, and by emperors, poets, saints, and statesmen of various countries and eras. Though these documents were spurious, with the exception of about 100, Chasles, Élie de Beaumont, and Balard regarded the whole of them as genuine, and Charles Dupin insisted upon their being published by the government. Lucas was sentenced, Feb. 23, 1870, to two years' imprisonment for forgery and fraud. The principal works of Chasles are: *Aperçu historique sur l'origine et le développement des méthodes en géométrie* (Paris, 1837; German translation by Sohneke, Halle, 1839); *Sur l'attraction des ellipsoïdes* (1837 et seq.); *Histoire de l'arithmétique* (1843); *Sur l'attraction des corps de forme quelconque* (1845); *Traité de géométrie supérieure* (1852; German translation by Schnuse, Brunswick, 1856); and *Traité des sections coniques* (1865 et seq.).

CHASLES, Victor Euphémion Philarète, a French author, cousin of the preceding, born at Mainvilliers, near Chartres, Oct. 8, 1798, died in Venice, Aug. 3, 1873. In 1815, while a printer's apprentice, he was arrested on charge of entering into a political conspiracy. Having been released through the influence of Chateaubriand, he went to London, and entered the employment of Valpy, the classical publisher, and during seven years acquired great familiarity with English literature, and afterward on the continent with that of Germany. Later he visited other parts of Europe and the United States. Having returned to Paris in 1823, his contributions to periodicals and the *Journal des Débats* gave him the reputation of an accomplished literary critic. In 1827 he shared with Saint-Marc Girardin an academical prize for his essay on French language and literature in the 16th century. In 1837 he was appointed director of the Mazarin library, and in 1841 professor of the Germanic languages and literature in the collège de France. In 1870 he returned to this chair, after having filled for some time that of the languages and literature of southern Europe, during the exile of the regular incumbent, Edgar Quinet. His *Études de littérature comparée* treats, in about 20 separate volumes (1847-'64), of the literature of antiquity, of the middle ages, of Spain and Italy, of the English revolution, of the literature and civilization of England, of the Uni-

ted States, &c. He wrote books of travels and tales; prepared editions of the classics and of Molière; and made a number of translations from English and German.

CHASSÉ, David Hendrik, a general of the Netherlands, born at Thiel in Gelderland, March 18, 1765, died in Breda, May 2, 1849. He entered the army at an early age, and having at first joined the party of the patriots, fled to France on their defeat, and engaged in the French service. In 1793 he had attained the rank of lieutenant colonel, and went with Pichegru to Holland, where he was engaged against the English. Subsequently he served in the French army in the peninsula, and acquired a reputation for desperate bravery. King Louis conferred a title on him for his conduct at Ocaña, and he was afterward made lieutenant general for services in the passes of the Pyrenees. After the peace he went into the Dutch service, and distinguished himself in the battle of Waterloo. When the Belgians declared for separation, Baron Chassé was sent to Antwerp, and on the entrance of the revolutionary bands into the city he retired into the citadel (Oct. 27, 1830), consenting to an armistice. This was broken by the Belgians, whereupon Chassé bombarded that part of the town where the insurgents lay. In December, 1832, he defended Antwerp against the French, and on the capitulation of the fortress he was retained as a hostage, and removed to Dunkirk, but permitted to return to Holland after the signing of the preliminary treaty, May 12, 1833. Made a general of infantry in reward for his services at Antwerp, he spent most of his remaining years on his estate in Gelderland.

CHASSELOUP-LAUBAT. I. François de, marquis, a French soldier, born at St. Sernin, near Marennes, Aug. 18, 1754, died in Paris in October, 1833. Descended from a family of soldiers, he became one of the most skilful military engineers of his day. Declining to emigrate with his fellow noblemen, he rendered eminent service to the republic. He conducted the engineering operations at Maestricht in 1794, at Mentz in 1795, and in the Italian campaigns of 1796 and 1799. Charged shortly after with planning a new system of defensive operations, he strengthened the fortifications of Alessandria and made it the principal arsenal of the French. He planned the sieges of Colmar, Dantzic, and Stralsund, and was active in almost all the campaigns of Napoleon, including that of 1812 in Russia; after which he was appointed senator. During the hundred days he swore allegiance to Louis XVIII., who subsequently made him a marquis. As one of the judges of Marshal Ney, he was opposed to his execution. **II. Justin Prudent de**, count, and afterward marquis, son of the preceding, born in Paris in 1802, died there, Dec. 17, 1863. He had attained the rank of brigadier general when the department of Seine-Inférieure returned him in 1849 to the

legislative assembly, and Louis Napoleon rewarded him for his services by promoting him to be general of division in 1853 and grand officer of the legion of honor in 1859. **III. Justin Napoléon Samuel Prosper de**, marquis, brother of the preceding, born in Alessandria, Italy, during the French occupation of that city, March 29, 1805, died in Paris, March 31, 1873. He early entered the civil service, and in 1830 was sent as assistant commissioner to Algeria. In 1837 he was elected to the chamber of deputies, and subsequently became councillor of state. In 1849 he was returned to the legislative assembly, and remained a member of the legislature during Louis Napoleon's administration, of which he was a staunch supporter; and in 1851 he was for a time minister of marine. In 1858 he became a member of the colonial board established in connection with the new ministry of Algeria and colonies, presiding over it during nearly the whole period of its existence (1859-'60); after which he had charge of the portfolio of marine and colonies, and was made a senator. He instituted important measures for the improvement of maritime and colonial affairs, and displayed much activity as president of the French geographical society, and as a contributor to the *Revue des Deux Mondes*. In 1869 he officiated as minister, presiding over the council of state until the accession of Ollivier's administration, Jan. 2, 1870. His old constituents of Charente-Inférieure returned him to the national assembly in February, 1871. Called upon by that body to prepare a bill for the reorganization of the army, he submitted an important report on the subject in March, 1872.

CHASSEPOT, Antoine Alphonse, a French inventor, born March 4, 1833. Like his father, he became a workman in manufactories of arms, and becoming connected with those belonging to the government, he was made comptroller in 1858, and director in 1864. He acquired celebrity by inventing the rifle known by his name, which had occupied his attention for many years, though it was not adopted for the army until after the success of the Prussian needle gun in the campaign against Austria in 1866, when the necessity of having a similar arm to rival that of the Germans led to the hasty introduction of the Chassepot rifle in the French infantry and part of the cavalry. Chassepot derives a large income from the patent on his invention, and a lawsuit instituted in 1869 by M. Manceaux contesting his right to it proved unsuccessful. (See RIFLE.)

CHASTEL, Jean. See CHÂTEL.

CHASTELAIN, or Chastellain, Georges, surnamed the Adventurous, a French chronicler and poet, born at Alost, Flanders, in 1403, died in Valenciennes, March 20, 1475. He belonged to a noble family, studied and travelled extensively, became acquainted with the principal personages of his day, and about 1443 left the army to enter the service of Philip the Good, duke of Burgundy, and was employed by him in household duties and providing for his amusements,

as well as in political and diplomatic missions. On the death of Philip in 1467, he remained in the service of his son and successor Charles the Bold, who in 1473 made him knight of the golden fleece. He was one of the most prominent writers of his day, and his most famous work is *La grande chronique, ou liere de tous les hautz et grans faits de la Chrétienté souverainement de ce noble royaume de France et de ses dépendances, depuis l'an vingt* [1420] *jusques à maintenant* [1474], edited by Buchon in the *Panthéon littéraire* (Paris, 1837). His other writings deal with various historical subjects, and include some poetry. Kervyn de Lettenhove published in Brussels in 1863 *Œuvres de Georges Chastellain*.

CHASTELARD, or Châtelar, Pierre de Boscobel de, a French poet born about 1540, died in 1563. He was a nephew on his mother's side of the chevalier Bayard. He was handsome, young, a distinguished performer in the tilt yard, famous for his skill with the sword, an excellent dancer, a delicate musician, and a poet of some note in the French court during Mary Stuart's residence in that country. He was one of the French gentlemen who, as attachés of Marshal Damville's household, accompanied her on her return to her native land, and fell in love with her. He dedicated a poem to her, which, according to Brantôme, was answered by Mary, who also allowed him to accompany her on the flute when she sang, had frequent interviews with him, and, as Knox says, was so familiar with him, early and late, "that scarcely could any of the nobility have access to her." Whether warranted or not, the poet thought his addresses were encouraged by the queen, and concealed himself in her bedroom on the night of Feb. 12, 1563. He was discovered and ejected, and the queen, as soon as she heard of the occurrence, ordered him with a sharp reprimand to quit her court. Chastelard, however, four days later again concealed himself within a recess in her bedchamber at Burnt Island, where the queen stopped to spend the night on her way to Dunfermline and St. Andrews; and while her women were undressing her, he rushed out before them all and attempted, it is said, to plead for pardon. The screams of the queen and the ladies brought Murray, whom she conjured, in the first transports of fear and indignation, to "put his dagger into the villain." Murray, however, reminded his sister that he should be dealt with according to the laws of the realm. He was accordingly brought publicly to trial at St. Andrews, sentenced to death, and executed; the queen remaining inaccessible to all appeals for mercy. On mounting the scaffold he recited Ronsard's hymn of death, and as he was about to die he cried aloud, "Adieu, most lovely and cruel of princesses!" The most detailed relation of the tragic story is to be found in the writings of John Knox.

CHASTELER, Jean Gabriel Joseph Albert, marquis du, an Austrian general, born in the

castle of Mulbaes, in Hainaut, Jan. 22, 1763, died in Venice, March 10, 1825. He was descended from the ducal family of Lorraine. In 1778 he entered the Austrian service, and served in the war of the Bavarian succession, and in 1789 in the war against the Turks. In 1792 he defended the citadel of Namur for 14 days against the French, and was taken prisoner, but exchanged the next year, and highly distinguished himself in the succeeding campaigns, reaching the rank of general. In 1795 he bore an active part in the third partition of Poland, and in 1798 was sent as envoy to St. Petersburg to engage Czar Paul in a second coalition against France. In 1799 he was quartermaster general in the Russo-Austrian army in Italy, and was dangerously wounded before Tortona. In the following years he repeatedly commanded in the Tyrol, distinguishing himself chiefly during the general uprising of 1809, when he gained considerable advantages over the ablest French generals. Napoleon, in an order of the day, styled him the chief of the brigands, and directed that if captured he should be brought before a court martial and shot within 24 hours. He was at length, May 13, 1809, completely routed at Wörgl by the French under Marshal Lefebvre, and made his escape to Hungary with only a handful of followers. After the treaty of Vienna he was made commandant of Troppau, then governor of Theresienstadt, and in 1813 of Dresden. When in 1815 the Lombardo-Venetian kingdom was established, he was made governor of Venice, which post he retained until his death. A monument to his memory was erected in Venice by the Austrian government.

CHASTELLUX, François Jean, marquis de, a French military officer and man of letters, born in Paris in 1734, died there, Oct. 28, 1788. At an early age he entered the army, and distinguished himself in Germany during the seven years' war, and afterward in America, where he served as major general in the army of Rochambeau, and where his amiable character gained for him the friendship of Washington. The work which established his literary reputation was entitled *De la félicité publique*, published in 1772. The leading idea of this work was the progress of the human mind as understood by Condorcet and his friends. It is wanting in plan and method, and noted for its bitterness against Christianity. It is now simply regarded as a literary curiosity, although considered by Voltaire as superior to Montesquieu's *L'Esprit des lois*. The *Voyages dans l'Amérique Septentrionale*, published in 1786, contains his journal written while travelling from Newport to Philadelphia, and thence to Saratoga and Portsmouth, and also his journal of travels in Virginia. It has notices of the natural history of the country, interesting details concerning the localities and events of the war of the American revolution, and observations on the character of the principal heroes of that war. It is in an agreeable and lively style,

sometimes eloquent and sometimes frivolous, and is valuable as conveying the impressions made by our revolution upon an intelligent foreigner. The most interesting portion is the account of Mr. Jefferson, whose guest he was at Monticello. Only 24 copies were printed, but an English translation was published in London, with maps and engravings (2 vols. 8vo, 1787). His *Discours sur les avantages et les désavantages qui résultent pour l'Europe de la découverte de l'Amérique* appeared in 1787, and resolved the question, which had been proposed by Raynal, in favor of the advantages. It was praised by La Harpe as the best of the works of Chastellux.

CHASUBLE (low Lat. *casubula*, from *casula*, a hut), the outer vestment worn by Catholic priests in the celebration of mass. It was originally common to both civilians and churchmen, and consisted of a circular piece of cloth with an opening for the head in the centre. Those among the Greeks who have retained it call it very properly *planeta*, because it can be turned on every side by the wearer. It long retained its circular form in the British islands, as is evident from the iconographic monuments of the middle ages. At Rome, however, and throughout all the adjoining countries, it soon became modified, on account of its exceeding inconvenience. It was either slit or folded up beneath the arms of the celebrant; and finally it has assumed the form, which is now universal in the Latin church, of an oblong piece of silk with a hole in the middle for the head, and falling down to the knees before and behind. It must be of silk, and the color varies with the festivals.

CHAT, a genus of warblers (*icteria*), placed by Baird in the subfamily *sylicolinae*. The best known species is the yellow-breasted chat (*I. vireidis*, Bonap.). The bill is shorter, stronger, and more curved than in the typical warblers, in this respect more nearly resembling the vireos and the shrikes. The upper parts are olive-green; under parts and inside of wings gamboge-yellow for anterior half of body; rest of under parts white, tinged with brown on the sides; forehead and sides of head ash; lores and region below the eyes blackish; a white stripe from the nostrils over the eye; patch on lower lid, and stripe from side of lower mandible, white; bill black. Female like the male, but smaller. Length 7.4 in., tail 3.3, wing 3.25. It is found over the eastern United States to the Missouri, and south to Guatemala. The long-tailed chat (*I. longicauda*, Lawr.) differs from the above chiefly in having the tail nearly half an inch longer; it may be only a western variety. They are very noisy birds, jealous of intruders, and apparently scolding in a great variety of notes. The food consists principally of insects. They are most abundant in the middle and southern states, and are peculiar to America. (See **STONE CHAT**.)

CHATEAUBRIAND, François Auguste, viscount de, a French author and statesman, born at

St. Malo in September, 1768, died in Paris, July 4, 1848. He sprung from a noble family which was known in Brittany as far back as the 10th century. He passed his childhood on his patrimonial estate of Combours, and received his education at the colleges of Dôle and Rennes. When he was 17 years old he received a commission as second lieutenant in the army, and was two years later promoted to a captaincy. About the same time he was presented at court, introduced to the fashionable world, and became acquainted with La Harpe, Fontanes, and other eminent writers. His first production, an idyllic poem, *L'amour de la campagne*, revealed nothing of the genius which he afterward manifested. The revolutionary movements which agitated Paris induced him to embark for the United States in the spring of 1791, with a view to seeking for the northwest passage. He landed at Baltimore, and repaired immediately to Philadelphia, where he delivered to President Washington a letter of introduction from the marquis de La Rouairie. The young traveller dined with the president, who in the course of conversation made allusion to the obstacles his guest was exposed to meet in his intended expedition. "But, sir," said the traveller, "it is less difficult to discover the polar passage than to create a nation, as you have done." Chateaubriand then visited New York, Boston, and Albany, and went among the Indian tribes, living with them, and exploring the country bordering on the great lakes. He afterward travelled through Florida, and spent some time among the Natchez. These peregrinations among the savages, the strange beauties of the American continent, the immensity of its rivers, the solitude of its forests, made a powerful impression upon his imagination. Nearly a year had thus been passed when an English newspaper which he found in a log cabin informed him of the flight and arrest of Louis XVI., and he returned to France in order to place himself at the disposal of the king. Finding on his arrival at Paris that by his presence there he could not benefit the royal cause, but endangered his own life, he joined the emigrants at Coblenz. Before leaving France, however, he married Mlle. Céleste Delavigne Buisson, an excellent woman, who during her long life was his faithful but rather neglected wife. Having enlisted in a company who followed the Prussian army in their invasion of France, he was wounded while skirmishing in the vicinity of Thionville; at the same time he had a severe attack of smallpox, and was left nearly dead on the road. A charitable person took care of him, and he was carried to Jersey, where he recovered his health. In 1793 he went to London, where he lived in an unfurnished garret, without fire, sometimes without food, happy when he was able to earn something by giving French lessons or making translations for booksellers. In 1797 he published his *Essai historique, politique et moral sur les révolutions anciennes et*

modernes, considérées dans leurs rapports avec la révolution française; it was rather unsuccessful in England and entirely ignored in France. He was then of a skeptical and somewhat materialistic turn of mind; but, being recalled to religious convictions by the dying appeal of his mother, he framed the plan of his *Génie du Christianisme*, and, encouraged by Fontanes, whom he had met in London, engaged in writing it. About this period he succeeded in re-entering France under an assumed name, and supported himself by literary work, while completing the *Génie du Christianisme*. The episode of *Atala*, which was incorporated in this work, was published separately in the *Mercure de France* in 1801, and excited much attention. The *Génie du Christianisme*, published in 1802, was the signal of a literary and moral revolution, and greatly contributed to the revival of religious principles in France. Bonaparte, being pleased with the book, appointed the author secretary of the French legation at Rome in 1803, and he was promoted in 1804 to the office of chargé d'affaires; but the execution of the duke d'Enghien put an end to his friendly intercourse with Napoleon. He resigned his office, and afterward assailed the emperor most bitterly. In 1806 he visited Greece, Asia Minor, Palestine, and Egypt, and on his return retired to a small villa situated in the Vallée aux Loups, near Paris, where he composed *Les martyrs*, the most admired of his works, which was published in 1809. The notes of his travels were subsequently arranged to form the *Itinéraire de Paris à Jérusalem*. In 1811 he was made a member of the French academy, as the successor to Marie Joseph Chénier, but some difficulty as to his reception speech prevented his taking his seat, which he did not occupy till after the restoration. This was hailed with enthusiasm by Chateaubriand, who as early as March 30, 1814, had published a political pamphlet, *De Bonaparte et des Bourbons*, which was eagerly sought for and did excellent service to the king's cause. This was his first step in politics; and "this new life of his," Sainte-Beuve says, "may be divided into three parts: 1, from March 30, 1814, to June 6, 1824, the period of pure royalism; 2, from June 6, 1824, when he was dismissed from the cabinet, to the end of the restoration, the period of liberal opinion, in flagrant opposition with the foregoing; 3, the period of mixed royalism and republicanism subsequent to the revolution of 1830, when Chateaubriand, for conscience sake, said to the duchess of Berry, 'Your son is my king,' while at the same time befriending Carrel and Béranger, and preparing himself beforehand for the coming republic." On the first return of the Bourbons, Chateaubriand was appointed ambassador to Sweden; but before he had departed for his post, Napoleon reappeared in France, and Chateaubriand followed Louis XVIII. to Ghent, became a member of his cabinet, presented him with his *Rapport sur l'état de la France*, and

was on the second restoration appointed minister of state and peer of France; but having assailed, in the pamphlet *De la monarchie selon la charte*, the celebrated decree by which the *chambre introuvable* was dissolved, he forfeited the royal favor and lost his office. He now joined the ultra-royalist opposition, and became one of the principal editors of the *Conservateur*, the most powerful organ of that party. In 1820 he was reconciled with the court on occasion of the assassination of the duke of Berry, and wrote his *Mémoires* of that prince. In the same year he was appointed minister to Berlin, and in 1822 ambassador to London. He was one of the plenipotentiaries at the congress of Verona, where he was instrumental in bringing about the French expedition to Spain. On his return to France he was appointed minister of foreign affairs, but being unable to agree with the prime minister, M. de Villèle, he was summarily dismissed, June 6, 1824. This time, instead of returning to his old associates, he joined the liberal opposition. He now proved himself the most ardent supporter of the freedom of the press, and eloquently advocated the independence of Greece, by which he acquired great popularity. On the fall of Villèle in 1828 he was made ambassador to Rome, but resigned on the formation of the Polignac cabinet. After the revolution of 1830 he manifested the most chivalric devotion to the duke of Bordeaux, notwithstanding his grievances against the family and his attachment to the principles of liberty. He was at that time, as he said himself, "a Bourbonist from the point of honor, a royalist by reason, a republican by taste and disposition." He now ceased to take any active part in politics, and even abandoned his seat in the chamber of peers, but occasionally published bitter pamphlets against the new government, in which he defended the rights of the fallen dynasty. In 1833 judicial proceedings were instituted against him on account of his *Mémoire sur la captivité de la duchesse de Berry*; but he was acquitted by the jury. He also repeatedly visited the exiled Bourbons at Prague. These occasional bursts of political passion interfered but little with his literary pursuits. As early as 1831 he had published his *Études, ou discours historiques*, which were but an introduction to a history of France on a plan of vast proportions; unhappily, age and pecuniary embarrassments prevented his finishing the work. He completed, however, some lighter but more profitable performances; his *Essai sur la littérature anglaise*, followed by a literal translation of Milton's "Paradise Lost," commanded general attention, while his *Congrès de Vérone* was eagerly read by the students of political history. From 1834 he devoted most of his time to completing an autobiography, which he called *Mémoires d'outre-tombe* (12 vols., 1849-'50; new illustrated ed., 8 vols., 1856, and 6 vols., 1861; German translation, 2d ed., Jena, 1852). This work he sold in advance

in 1836, and afterward lived on the annuity which was secured to him by the proceeds. His life was spent in retirement, the drawing room of his friend Mme. Récamier being almost the only place he visited. There he could be seen every evening among the *élite* of the literary world, receiving the homage to which he was entitled by his character, genius, and renown. A profound melancholy, however, invaded his latter years. He who had so often foretold the coming of the republic in France, witnessed its accession in 1848, but he died amid the desolation brought over the capital by the bloody struggle of June. Most of his works have been translated into the English, German, and other languages. The complete and separate editions are numerous. The best of the former is by Sainte-Beuve (12 vols., 1859-'61), with a review of his literary labors. Part of a new and complete illustrated edition, to consist of 14 volumes, has appeared since 1864. Marin's *Histoire de la vie et des ouvrages de M. de Chateaubriand* appeared in 1833, and M. Villemain's *Chateaubriand, sa vie, ses écrits, son influence sur son temps*, &c., in 1858, in 2 vols.

CHÂTEAUBRIANT, Françoise de Foix, countess de, a mistress of Francis I. of France, born about 1485, died Oct. 16, 1537. A scion of the illustrious house of Foix, she repaired at an early age to the court of Louis XII., and became the wife of the count de Chateaubriant. She was in the zenith of her beauty when Francis I. ascended the throne. Notwithstanding the jealous temper of her husband, the king was soon on intimate terms with the beautiful countess, who publicly wore jewelry given to her by her royal lover, bearing mottoes which his sister Margaret had written at his request. The royal favor served the interests of her brothers as well as her own ambition. Her husband, however, resented her faithlessness by frequently inflicting upon her corporal punishment. Her relations with the king lasted for a number of years, and until the defeat of Pavia (1525) and the captivity of Francis her influence over him was unbounded; but on his return from Madrid she was supplanted by Anne de Pisseleu, afterward duchess d'Étampes. The rest of her life was spent with her husband in the now dismantled castle of Chateaubriant. A chamber is still pointed out in which, according to tradition, she was bled to death by her husband. This, however, is not supported by any positive evidence, although his brutal treatment of her was notorious.

CHÂTEAUDUN, a town of France, in the department of Eure-et-Loir, on the left bank of the Loir, 25 m. S. of Chartres and 30 m. N. W. of Orleans; pop. in 1866, 6,781. It is prettily situated on a commanding elevation, and contains a fine square and promenade, and a number of handsome public buildings. The principal churches are the Madeleine and St. Valerien, built in the 12th century. The most conspicuous edifice is the ancient castle of the counts

Dunois, built on a rock and surmounted by a high tower, with a famous staircase and other curious appendages. The trade is mainly in the local agricultural and industrial products, including nails, cordage, leather, woollen and silk goods, hosiery, and hats. The viscounts of Chateaudun ruled here from the 11th to the 15th century, when the last of them dying childless, Duke Charles of Orleans became the local ruler; he relinquished his supremacy in favor of his natural brother John, the bastard of Orleans, famous for his exploits in the wars with England. The town was destroyed by fire in 1723, and rebuilt on an improved plan. During the war of 1870-'71 the French were defeated here by Gen. Willich, who soon after took the town by assault, Oct. 18, 1870.

CHÂTEAU-CONTIER, a town of France, in the department of Mayenne, on the river Mayenne, 18 m. S. of Laval; pop. in 1866, 7,364. The town has a Gothic church, a communal college, public baths, and manufactures of linen, woollen, and leather. In October, 1793, the insurgent royalists gained here a great victory over the republicans.

CHÂTEAUGUAY, a S. W. county of the province of Quebec, Canada, bordering on the St. Lawrence, and traversed by the Châteauguay, the Noire, and other streams; area, 249½ sq. m.; pop. in 1871, 16,166, of whom 11,288 were French, 2,496 Scotch, and 1,937 Irish. The soil is fertile and the surface presents little variety of level. The battle of Châteauguay or of Chrysler's farm was fought in this county, Oct. 26, 1813, between Col. de Salaberry of the Canadian voltigeurs and Gen. Wilkinson of the American army, who intended to invade Canada by the Grand Isle which divides the river St. Lawrence opposite Coteau du Lac. The Canadians were victorious. Chief town, Ste. Martine.

CHÂTEAUGUAY, Sieur de. See LE MOYNE.

CHÂTEAUROUX, a town of France, capital of the department of Indre, on the left bank of the Indre and on the railway from Paris to Bordeaux, 160 m. S. S. W. of Paris; pop. in 1866, 17,161. It has a theatre and public library. There is an old castle on an eminence above the Indre, a gloomy building, in which the princess de Condé, niece of Richelieu, died in 1692, after having been imprisoned there for nearly 23 years. Châteauroux is one of the principal cloth manufacturing places of central France, the wools produced in Berry being almost exclusively used in the fabrication. There are various other manufactures, and important wool and iron fairs are held here. There is a government tobacco manufactory, in which 1,000 persons are employed.

CHÂTEAUROUX, Marie Anne, duchess de, a favorite of Louis XV., born about 1718, died Dec. 8, 1744. She was a daughter of the marquis de Nesle, lost her mother in 1729, and following her example as well as that of three of her sisters, she became in 1742, after the death of her husband the marquis de la Tournelle,

the principal mistress of Louis XV., who conferred upon her (Oct. 20, 1743) the title of duchess de Châteauroux, with a large domain and a pension of 80,000 francs. With her sister Mme. de Lauraguais she joined the king during the war of 1744, and notwithstanding the insults which were heaped upon her by the soldiers, she followed him to Lille, Ypres, Dunkirk, and Metz, when the king during his illness was prevailed upon to expel her ignominiously from his presence. After his return to Paris, she consented to be reconciled to him only on condition that her principal persecutors, including the bishop of Soissons and La Rochefoucauld, should be banished from Paris, and that the minister Maurepas, who had addressed her as the incestuous La Tournelle, should make a humble apology. Soon afterward she died suddenly, amid terrible convulsions, charging Maurepas with having poisoned her. She squandered immense amounts of public money, spent 1,200,000 francs upon her palace at Choisy, and displayed great frivolity and recklessness in other respects. A collection of her letters was published in Paris in 1806, and Sophie Gay wrote a novel entitled *Madame le duchesse de Châteauroux* (2 vols., 1834-'9).

CHÂTEAU-THIERRY, a town of France, in the department of Aisne, on the right bank of the Marne, and on the Paris and Strasburg railway, 45 m. N. E. of Paris; pop. in 1866, 6,519. It is a pretty town, laid out in the form of an amphitheatre, with handsome promenades, and united by a fine stone bridge with a suburb on the other side of the Marne. The church of St. Crispin resembles a fortress, and possesses great archæological interest. La Fontaine was born here, and a marble statue has been erected to his memory. There are two medicinal springs in this town, which attract many visitors in summer. The manufactures are unimportant, but the trade in agricultural products, cattle, and wool is exceedingly active, the surrounding region being the most fertile of the ancient province of Champagne.—The settlement and name of the town originated from a feudal castle built in 720 by Charles Martel as a residence for the youthful Thierry IV., of which vestiges are still visible. It was captured by the English in 1421, and by Charles V. in 1544; and Henri de Guise received a wound here in 1575 whence he was called *le balaféré*. A duchy since the 16th century, the town continued to be the capital of Brie-Champenoise till the revolution of 1789. A memorable battle was fought here Feb. 12, 1814, in which Napoleon defeated the Russians and Prussians under Sacken.

CHÂTEL, Ferdinand Toussaint François, abbé, a French religious reformer, born at Gannat, Jan. 9, 1795, died in Paris, Feb. 13, 1857. His parents were poor, and he was apprenticed to a tailor; but his parish priest, pleased with the boy's religious zeal, defrayed the expenses of his education. He was ordained as a priest in

1818, and became vicar at Moulins and elsewhere, and afterward was chaplain in the army till about 1830. Having acquired celebrity as a preacher, and written in favor of theological reforms, he attempted in 1831 to found a new sect, based upon natural religion, venerating Christ only as a model man, doing away with the confessional, fasting, and vows of chastity, and substituting French for Latin in the liturgy. He was consecrated as the primate of the so-called French Catholic church, which gained many adherents. He was not molested by the authorities till 1842, when his places of worship were closed. After the revolution of Feb. 24, 1848, he reopened them and came forward as a champion of women's rights. In 1850 the authorities again put an end to his public performances, but he remained faithful to his convictions to the last. He was employed as a metropolitan postmaster in the latter part of his life. His principal publications are, *Profession de foi de l'église catholique française* (Paris, 1831), and *Le code de l'humanité, ou L'Humanité ramenée à la connaissance du vrai Dieu et au véritable socialisme* (1838).

CHÂTEL, Jean, a French fanatic, born in Paris about 1575, executed Dec. 29, 1594. He was the son of a rich shopkeeper, and studied divinity under the Jesuits, and philosophy in the university of Paris. He regarded Henry IV. as a heretic who reigned without the sanction of the pope, and was impelled by religious fanaticism to stab him on Dec. 27, 1594, in the apartment of the royal palace occupied by Gabrielle d'Estrées, the king's mistress, inflicting a slight wound with a knife upon the upper lip of the king and knocking out one of his teeth. Though it was believed that he had been instigated by the Jesuits, who were consequently for a short time expelled from Paris, he declared to the last, and while he was undergoing torture, that he had acted entirely of his own accord. His remains were mutilated and dragged through the streets after his execution. A colossal pyramid was erected on the site of the house which he had inhabited, as an expiatory memorial of his crime; but it was subsequently demolished upon the demand of Père Cottin, who regarded the inscription upon it as disparaging to the society of Jesus.

CHÂTELET (Lat. *Castellucium*), the name of two fortresses which existed in Paris in former times, said to have been built by Julius Cæsar. The Grand Châtelet was restored and enlarged by Louis IX., Charles VIII., and Louis XII., remodelled by Louis XIV., and demolished in 1802. It stood on the right bank of the Seine, in the locality now occupied by the western part of the place du Châtelet. It was the residence of the counts and afterward of the provosts of Paris, and became celebrated as a prison and as an important seat of the judiciary. At the time of the suppression of the latter in 1790, the court contained, from the

provost down to the ushers and policemen, 1,207 officers, besides a large number of lawyers who transacted business there, and the military forces of the Châtelet, which consisted of two companies of soldiers, part of whom were at the same time employed as ushers. The Petit Châtelet was situated on the left bank of the Seine, on the site of the present place du Petit Pont; swept away by an inundation in 1296, it was rebuilt in 1369, and demolished in 1782. Originally it was one of the gates of Paris, where tolls and excise duties were levied. The châtelets at Orleans and Montpellier were, like those of Paris, the seats of judicial bodies.

CHÂTELET, Madame du. See DU CHÂTELET.

CHÂTELLERAULT, a town of France, in the department of Vienne, on the right bank of the Vienne, and on the railway from Paris to Bordeaux, 18 m. N. N. E. of Poitiers; pop. in 1866, 14,278. It is one of the great centres of the manufacture of cutlery in France, which gives employment to about 600 families. There is also a national manufactory of side arms, established in 1820. There are important iron works, manufactories of jewelry, laces, and hardware. An active trade is carried on in the product of the country, and in lithographic stones obtained from the neighboring quarries. A fine stone bridge, constructed by order of Sully, and called by him Pont Henri IV., connects the town with the suburbs on the left bank of the Vienne. At the E. end of the bridge is a huge castle, flanked with four massive towers, with a lofty arch in the centre of the building, under which the high road enters the town.

CHATHAM. I. A central county of North Carolina, drained by Rocky and New Hope rivers, and traversed by the Haw and the Deep, which unite in the S. E. part to form the Cape Fear; area, 700 sq. m.; pop. in 1870, 19,723, of whom 6,830 were colored. The surface is diversified, and the soil fertile and clayey. There are extensive beds of coal in the vicinity of Deep river, which is navigable as far as the mines. The Chatham railroad traverses the county, and there is a railroad from Fayetteville to the coal fields. The chief productions in 1870 were 156,763 bushels of wheat, 304,881 of Indian corn, 124,632 of oats, 43,677 of sweet potatoes, 252,346 lbs. of butter, and 52,210 of tobacco. There were 2,561 horses, 1,470 mules and asses, 5,410 milch cows, 6,356 other cattle, 15,531 sheep, and 31,333 swine. There were 1 mining company, 1 foundry and machine shop, 1 iron manufacturing company, and 13 flour mills. Capital, Pittsboro. **II.** A S. E. county of Georgia, bordering on the sea, bounded S. W. by the Ogeechee river, and N. E. by the Savannah, which separates it from South Carolina; area, 358 sq. m.; pop. in 1870, 41,297, of whom 24,518 were colored. The surface is level, and partly occupied by swamps. Near the rivers the soil is fertile and productive; in other parts it is barren and sandy. It is the most populous county of the state. The

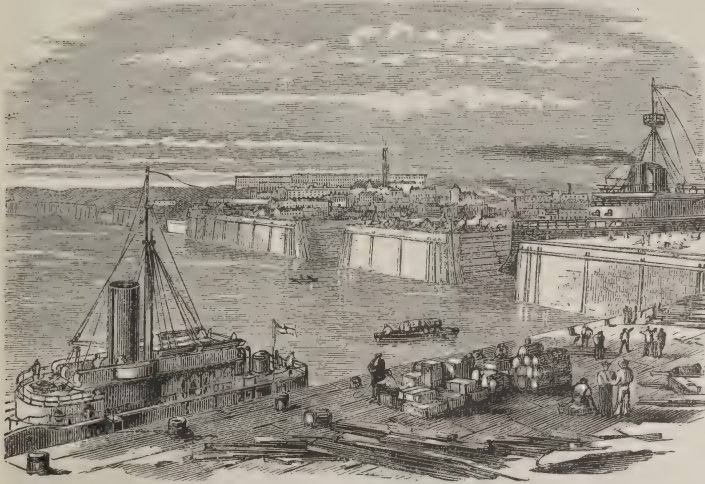
Georgia Central, the Atlantic and Gulf, and the Savannah and Charleston railroads traverse it. The chief productions in 1870 were 55,220 bushels of corn, 49,680 of sweet potatoes, 63 bales of cotton, 6,300 gallons of wine, and 8,-808,064 lbs. of rice. There were 312 horses, 681 mules and asses, 908 milch cows, 723 other cattle, and 1,917 swine. There were 6 manufactories of brick, 2 of cars, 1 of gas, 5 of machinery, 5 printing establishments, 4 saw mills, 4 flour mills, 7 manufactories of carriages and wagons, 1 of fertilizers, 2 of iron castings, and 1 of marble and stone work. Capital, Savannah.

CHATHAM, the chief town of Kent co., Ontario, Canada, 176 m. S. W. of Toronto, and 47 m. E. of Detroit, Mich., situated on the river Thames, which enters Lake St. Clair about 18 m. to the west, and is navigable for small vessels; pop. in 1871, 5,873. The Great Western railway passes through the town, and there is steamboat communication with Detroit. Chatham is surrounded by a fine agricultural country, and has a large trade in agricultural produce. Oak and walnut timber and staves are exported in large quantities. In 1871, 199 Canadian steam vessels of 2,245 tons, and 57 sailing vessels of 6,871 tons, entered; also 21 United States steamers, of 2,850 tons, and 121 sailing vessels of 8,980 tons. Many fine sailing vessels have been built here. The town has agencies of the bank of Upper Canada and the Government bank.

CHATHAM, a town of Barnstable co., Mass., forming the S. E. extremity of Cape Cod, about 75 m. S. E. of Boston, and 5 m. from the Cape Cod railroad; pop. in 1870, 2,411. The inhabitants are chiefly engaged in the merchant marine and in fishing; 30 or 40 vessels are annually employed in the cod and mackerel fishery, and 15 or 20 in the coasting trade. There are 4 churches, 1 high school, 12 grammar and primary schools, 5 post offices, and a weekly newspaper. The Chatham lights are on James's Head, at the S. E. extremity of the town, in lat. 41° 40' 20" N., lon. 69° 57' 12" W. They are two in number, fixed, and 70 ft. above the sea. There is also a lighthouse showing a fixed light, known as Monomoy light, on Cape Malabar, a narrow sandy beach extending S. into the sea some 10 m. from the main body of the town.

CHATHAM, a town of New Brunswick, Canada, in Northumberland co., on the right bank of the Miramichi river, near its mouth in Miramichi bay; pop. in 1871, 4,203. It has a Roman Catholic cathedral, college, and hospital, a masonic and a temperance hall, and is lighted with gas. The north shore and the Quebec and gulf port steamers call weekly. The town is to be connected with the International railway. It is a port of entry, whence large quantities of lumber and fish are exported. In 1871 the arrivals were 174 British vessels of 39,390 tons; foreign, 54, of 25,803 tons; and the total departures were 210, of 57,966 tons.

CHATHAM, a parliamentary and municipal borough and naval arsenal of England, county of Kent, situated on the right bank of the Medway, near its confluence with the Thames, 30 m. S. E. of London, and adjoining Rochester, with a station on the East Kent railway; pop.



New Docks and Repairing Basin.

in 1871, 44,135, including about 8,000 dockyard men and soldiers. It includes the village of Brompton just below it, on the same side of the river. It is a dirty, ill-built, irregular town, with many wooden houses and few buildings of interest. Its great feature, and the sole cause of its importance, is the vast naval establishment at its lower end, commenced by Elizabeth, and improved by her successors, until it is now one of the finest in Great Britain. The dockyard, which is about a mile long, contains six building slips, wet and dry docks, a rope house 1,140 ft. long, blacksmith shops, steam saw mills, oar and block machinery by Brunel, copper sheathing and paint mills, pattern room, arsenal, &c. Several ships in ordinary are moored in the river. To the marine barracks are attached a ship-gun battery and school. There are also barracks for the royal engineers, sappers, and miners, with a school for young officers and recruits, where lectures are given upon everything relating to the art of war. There are good libraries for both services, and naval and military hospitals. Work was commenced on the new dockyards in 1861, and the repairing basin was completed in 1871. On the land side all the works are shut in by a strong line of fortifications, with several defences on the Chatham and Brompton sides, among which are Forts Pitt and Clarence between the former place and Rochester, Fort Gillingham, Upnor castle, across the river, now used as a magazine, and a strong redoubt on an eminence at the S. E. end of the yard. The houses within this enclosure, which belong to the village of Brompton, are tenanted

chiefly by persons employed in the yard. In 1667 the Dutch under De Ruyter, after destroying Sheerness, sailed up the Medway with 17 light ships and 8 fire ships, broke a chain stretched across the river, destroyed several sail of the line and a quantity of stores, in the face of a hot fire from Upnor castle, and retired with trifling loss, carrying off a ship of war named the Royal Charles. In the improved condition of the defences, it is believed that such an exploit would be impossible.

CHATHAM, Earl of. See **PITT, WILLIAM.**

CHATHAM ISLANDS, a group in the Pacific, belonging to Great Britain, E. of New Zealand, between lat. 43° 40' and 45° 20' S., and lon. 176° and 177° 20' W. They consist of Wairikaori, or Chatham island, from 80 to 90 m. in circumference; Rangi-haute, or Pitt island, 12 m.

long by 8 broad; and a number of others which are mere barren rocks. The W. shore of the largest island is undulating, and clad with vegetation to the water's edge; the N. shore is flat; the S. and part of the E. rocky and precipitous. There are several bays and some good harbors, which have been frequented by whalers ever since the discovery of the group by Broughton in 1791. Near the middle of the island is Tewanga lake, 25 m. long and 6 or 7 m. broad, S. of which the country is generally arable, the products being similar to those of New Zealand. The climate is mild and healthy. The aboriginal inhabitants are of the Malay race, and darker than the New Zealanders.

CHATI (*felis mitis*), a leopard-like cat, smaller than the ocelots, with which it lives in South America. The general color is yel-



Chati (*Felis mitis*).

lowish white, with black irregular patches along the back, becoming lighter toward the sides; the tail is partially ringed with black. Though very gentle and almost domestic in captivity, it is very destructive in its native woods to small quadrupeds and birds; it prowls about hen roosts, and is one of the farmer's worst enemies. It sleeps or hides by day, and comes out at night; it is so active that no fence can keep it out, and so little that it can enter a very small aperture; it is also extremely wary and silent in its movements. Its native name is *chibigauzu*.

CHÂTILLON-SUR-SEINE, a town of France, in the department of Côte d'Or, on the railway from Paris to Mülhausen, 110 m. S. E. of Paris; pop. in 1866, 4,860. The Seine divides it into two parts, one of which is called Bourg and the other Chaumont. Formerly they were both enclosed by separate walls and ditches and defended by a castle, which still remains in the quartier de Chaumont. An active trade is carried on in the products of the country, and the industrial establishments comprise manufactories of cloth, serge, hats, and woollen and cotton yarns, tan yards, bark and fulling mills, and important iron works. Marshal Marmont was born here, and built on the spot a fine château. In the 12th century the town was an important military station, and the residence of the early dukes of Burgundy. Previous to the first revolution it was the capital of the Pays de la Montagne, which formed part of the government of Burgundy. In February, 1814, a conference was held here between the representatives of Napoleon and the allied sovereigns. On Nov. 19, 1870, Ricciotti Garibaldi surprised here a detachment of the 14th German army corps, which suffered severe loss, and was forced to fall back upon Châteauneuf. The town contains remarkable antiquities.

CHÂTRE, La, a town of France, in the department of Indre, 20 m. S. E. of Châteauroux; pop. in 1866, 5,167. It is pleasantly situated on the left bank of the river Indre, and contains a primary tribunal and a communal college. The castle which defended it is now in ruins, but one of its towers is used as a prison.

CHATSWORTH, a celebrated estate in the parish of Edensor, Derbyshire, England. A branch of the London and Northwestern railway leads from Manchester to Whaley bridge, and a coach from the latter place to Chatsworth. The place may also be reached by an omnibus from Rowsley, the terminus of a

branch of the Midland railway, which leaves from Ambergate. Chatsworth was among the domains given by William the Conqueror to William Peveril, his natural son. In the reign of Elizabeth it was purchased by Sir William Cavendish, who began to build a mansion here, which after his death was completed by his widow, the countess of Shrewsbury. The present building was nearly completed by the first duke of Devonshire, 1688-1706; a new wing was built by the sixth duke (died 1858), who greatly added to the beauty of the establishment. Chatsworth gardens are among the most famous in England. The grand conservatory is 300 ft. long, 145 ft. broad, and 65 ft. high, comprising an area of about an acre, with a carriage road in the centre. The great glass house of the *Victoria regia* lily was erected under the direction of Sir Joseph Paxton, the designer of the London crystal palace. The park is about 9 m. in circumference, and diver-



Chatsworth.

sified with hill and dale. South and southwest of the mansion are remarkable water works. The mansion, about 180 ft. square, is built around an open quadrangular court. The terraces in front are 1,200 ft. long. The state rooms, 190 ft. long, are full of paintings, carvings, and tapestries; the south galleries contain more than 1,000 drawings by foreign masters, and cabinet pictures. The principal works of art are sculptures by Thorwaldsen, Canova, Chantrey, and Westmacott, and paintings by Titian, Rembrandt, Murillo, and Landseer. Chatsworth house was for 13 years the prison of Mary Stuart. Hobbes also spent some time here. A "Handbook of Chatsworth and Hardwick" was published in 1846, by the then duke of Devonshire.

CHATTAHOOCHEE, a river of Georgia, which rises near the N. E. corner of the state, flows S. W. to West Point, thence nearly S., forming the boundary between the lower half of that state and Alabama, and unites with the Flint

to form the Appalachicola; length about 550 m. It is navigable for steamboats to Columbus, 300 m. from the gulf of Mexico.

CHATTAHOOCHEE, a S. W. county of Georgia, bounded N. by Upotony creek, and separated from Alabama on the W. by the Chattahoochee river; area, 250 sq. m.; pop. in 1870, 6,059, of whom 3,405 were colored. The surface is somewhat diversified. The chief productions in 1870 were 2,331 bushels of wheat, 107,453 of Indian corn, 16,136 of sweet potatoes, and 4,374 bales of cotton. There were 235 horses, 781 mules and asses, 896 milch cows, 2,042 other cattle, and 4,737 swine. Capital, Cusseta.

CHATTANOOGA, a city and the capital of Hamilton co., Tennessee, at the base of Lookout mountain, near where the S. boundary of the state touches Alabama and Georgia; pop. in 1870, 6,093, of whom 2,221 were colored. It is on the Tennessee river, 250 m. by water from Knoxville, and 150 m. S. E. of Nashville. The river is navigable by steamboats eight months of the year, and by small boats at all times. The Nashville and Chattanooga, East Tennessee and Georgia, Alabama and Chattanooga, and Western and Atlantic railroads connect here. There are two national banks, with \$470,000 capital, and a discount and deposit bank. It is the shipping point for most of the surplus productions of East and of a portion of Middle Tennessee, and contains a number of mills and factories. The surrounding country is supplied with water power, well wooded, and rich in coal and iron.—During the civil war Chattanooga was an important strategic point for the operations in eastern Tennessee and Georgia. After the engagement at Stone River, near Murfreesboro (Dec. 26, 1862, to Jan. 2, 1863), the confederates, under Bragg, fell back to Chattanooga, which they abandoned Sept. 8, upon the approach of Rosecrans. The confederates, being reënforced by Longstreet's division from the army of Virginia, manœuvred to drive Rosecrans from Chattanooga, while he attempted to force them from their threatening position in the neighborhood. The result was the battle of Chickamauga, fought Sept. 19, 20, about 12 m. S. W. of Chattanooga. (See CHICKAMAUGA.) After his repulse, Rosecrans continued to occupy Chattanooga, but was superseded (Oct. 19) by Thomas, and Grant was placed in command of the military division of the Mississippi, comprising the four departments commanded by Sherman, Thomas, Hooker, and Burnside. Bragg had despatched Longstreet to operate against Burnside near Knoxville, and meanwhile, by commanding the lines of supply, held Thomas practically besieged at Chattanooga. Grant reached Chattanooga Oct. 23, and at once formed plans for raising the siege. By a series of successful operations the lines of supply were opened, and soon after the middle of November the Union force at Chattanooga was raised to about 80,000, while the confederates had not more than 50,000. Grant now re-

solved to force the enemy from his commanding position, which lay in a semicircular form on the heights overlooking Chattanooga, Lookout mountain being on the south and Missionary ridge on the east. The operations began Nov. 23, when the confederate picket line was forced back, and favorable positions secured. On the morning of the 24th Hooker with 10,000 men was sent to assail the confederate left, strongly posted on the Tennessee upon the slopes of Lookout mountain. A dense fog covered the sides, concealing the movement from the enemy; and the confederates, taken by surprise, abandoned the position, with a loss of 2,000 prisoners. Hooker's force encamped for the night upon the upper part of the slope which they had won. This engagement is generally designated as the battle of Lookout mountain, sometimes as the battle above the clouds. Sherman was ordered on the morning of the 25th to assault the confederate centre and right, which occupied a long line on the heights of Missionary ridge, in a position so strong, that, as Bragg says, "though greatly outnumbered, no doubt was entertained of our ability to hold it, and every disposition was made for that purpose." Several determined attacks were repelled; but late in the afternoon three divisions of Thomas's army, under Sheridan, T. J. Wood, and Baird, stormed the ridge and broke the confederate line, when, says Bragg, "the enemy, having secured much of our artillery, soon availed themselves of our panic, and, turning our guns upon us, enfiladed our lines both right and left, rendering them wholly untenable. Fortunately it was now near nightfall, and the country and the roads in our rear were fully known to us, but unknown to the enemy. The routed left made its way back in great disorder. After informing myself of the full condition of affairs, it was decided to put the army in motion for a point further removed from a powerful and victorious army, that we might have some time to replenish and recuperate for another struggle." This action is generally known as the battle of Missionary ridge. The confederates were pursued for a space on the 26th. The Union loss during the three days was 5,616, of whom 757 were killed, 4,529 wounded, and 330 missing. The confederate loss in killed and wounded was smaller, probably not more than 4,000; but 6,142 prisoners were taken, together with 40 guns and 7,000 stand of small arms. The results of this action were on both sides recognized as of great importance. In effect, it put an end to the war in Tennessee for a year, when it was resumed there by Hood in the battles of Franklin and Nashville.

CHATELS (law Lat. *catalla*), a term used to designate personal property. This is of two kinds: chattels personal, including movable goods, as domestic animals, money, harvested crops, &c.; and chattels real, under which term are included all interests in land which are less than freehold, that is to say, which are

not estates in fee or for life. Chattels, on the death of the owner without a will, pass to his personal representatives instead of his heirs at law, and they constitute the primary fund for the payment of debts. Chattels personal may be transferred by mere delivery, without writing; and chattels real did not at the common law require for their creation or assignment livery of seisin. Some things are either real estate or chattels according to circumstances. Thus, a house belonging to the owner of the land it is built upon constitutes a part of the freehold; but if owned by a mere tenant, who has a right to remove it, it is his personal chattel. So an unharvested crop may be a part of the realty or a chattel, according as it does or does not belong to the owner of the soil.

CHATTERTON, Thomas, an English poet, born in Bristol, Nov. 20, 1752, died in London, Aug. 24, 1770. His father, who was a school teacher, died three months before his birth. At five years of age he was sent to a charity school, but was withdrawn after a year and a half as an incorrigible dunce. His mother then, taking him in charge, attracted his curiosity by an old manuscript with illuminated capitals, from which he rapidly learned to read. He resolutely prosecuted his studies, mastered various treatises on antiquities and heraldry, and conceived the wildest dreams of ambition. Sent again to school in his eighth year to a pedant of poetry, he was almost the only pupil whom his master could not excite to poetical enthusiasm. In this school he remained seven years, veiling beneath an appearance of melancholy and incapacity the labor of an original mind, taking no interest in his associates, and devoting himself intensely to miscellaneous reading. In his 11th year he wrote verses, the fruits of painful elaboration, and chiefly of a satirical character. In his 12th year he completed the poem of "Elinoure and Iuga." His mother and sister, who seem to have been the only objects of his love, were surprised at his change to unwonted vivacity, and at the brilliant hopes which he expressed as well for them as himself. In 1767 he was apprenticed to an attorney in Bristol, and though laboriously occupied in the drudgery of copying, he yet found time to continue his study of history, theology, and especially antiquities and old English phraseology. In the next year he began his unparalleled series of literary impositions. A new bridge being finished at Bristol, he sent to a journal of the place an account of the ceremonies on opening the old bridge, which he pretended was taken from an ancient manuscript. Being questioned, he said he had found the parchments in the chest of a wealthy merchant of the reign of Edward IV., "Canynge's cofre," which, having been preserved in a room of the Redcliffe church, had in 1727 been broken open by proper authority, and some old deeds being taken from it, the remaining MSS. had been left exposed as of no value. Chatterton's father had taken a number of these parch-

ments to serve as covers for books in his school, and among those remaining the youthful poet affirmed that he had found many writings of Mr. Canynge and his friends, especially of Thomas Rowley, an ecclesiastic and poet. He was prepared to confirm his tale by several compositions which he had already finished, and by parchments which he had stained to resemble antiques. To a pewterer named Burghum, ambitious of heraldic honors, he gave a pedigree tracing his descent from the noble Norman family of De Bergham; to the historian of Bristol he presented an account of all the churches in the city as they appeared 300 years before, which he had drawn from the writings of the "gode prieste Thomas Rowley;" to a theologian he sent a fragment of a sermon on the Holy Spirit, as "wroten" by Rowley; to a wealthy citizen he presented a poem, the "Romaunt of the Cnyghte," written by one of his ancestors four centuries before. He contributed several fictitious poems to the "Town and Country Magazine" of London; and to Horace Walpole, then preparing his anecdotes of British painters, he sent an account of eminent "carvellers and peyncters" who once flourished in Bristol. He labored without a confidant, sleeping little, preferring to write by moonlight, since he believed that the presence of that planet added to his inspiration, roaming over the country on Sunday, lying in meadows, where in a sort of trance he would contemplate old churches and edifices, and nursing in solitude a wild and vain enthusiasm and a stoical pride of talent. The literary antiquaries, who had just been at war about the authenticity of Ossian, engaged in new controversy about the productions of Chatterton. Walpole was at first deceived by them, but having submitted them to Mason and Gray, the latter pronounced them to be forgeries. The result was that Walpole returned his MSS. to the young poet, who indignantly avenged himself by a bitter satirical attack. In his 18th year Chatterton was dismissed from his apprenticeship, and set off for London. He designed a literary career, but declared that if disappointed he would become a Methodist preacher, a founder of a sect, or would have the pistol for his final resort. He contributed to reviews and magazines; wrote political letters, sermons for clergymen, and songs for the public gardens; was introduced to the lord mayor Beckford, formed high expectations of influence as an opposition writer, and boasted that he "would settle the nation before he had done." At the death of Beckford soon after, he is said to have gone almost frantic; he dissipated his despair in elegies, removed to wretched lodgings, continued in his misery to remit presents to his mother and sister, to whom he had before announced his splendid hopes, suffered for want of food while with a gay exterior he frequented places of public amusement, retained his unconquerable pride and vanity, confided his distress to

no one, declined the invitation of his landlady to a dinner after he had been three days without food, spent his last penny for a dose of arsenic, and was found dead in his room surrounded by numerous manuscripts which he had torn into shreds. He was interred in the pauper burying ground of Shoe lane, and the citizens of Bristol have erected a monument to his memory. It was several years before he became an object of public interest, and the result of the discussion concerning the poems which he ascribed to Rowley and other old poets is the general belief that, however extraordinary it was for Chatterton to have written them, it was impossible for them to have been written in the 15th century. In a life of less than 18 years this misdirected genius made himself proficient in the most various studies, created the person, history, and language of an ancient poet, composed epics, tragedies, satires, elegies, ballads, and long narrative poems, and exhibited not only a facility of versification but a luxuriance of fancy and power of invention which promised him a high position among English poets. The early poems of Pope and Cowley are not comparable to those of Chatterton, and even the almost fabulous *Mirandola* was less precocious if not less great. Warton called him a "prodigy of genius;" Shelley acknowledged his "solemn agency;" Wordsworth names him "the marvellous boy;" Keats dedicated "*Endymion*" to his memory; and Alfred de Vigny has made him the subject of one of his finest dramas, in which he represents him as the type of suffering and unrequited genius. The personal appearance of Chatterton was proud, manly, and very prepossessing. His eyes were gray and piercing, and, as in the case of Lord Byron, one of them was more brilliant than the other.—Chatterton's "Miscellanies in Prose and Verse" were published in 1778. An edition of his works, with his life, was prepared by Southey and Cottle in 1803. There have been several editions and biographies, the latest published in London, 1872.—See "Chatterton, a Biographical Study," by Daniel Wilson (London, 1870).

CHATTOOGA. I. Or *Chatuga*, one of the head branches of the Savannah river, rises near the S. frontier of North Carolina, and flows S. W. about 40 m. along the boundary between South Carolina and Georgia. II. A river of N. W. Georgia, rises in Walker co., and flows S. S. W. about 55 m. through Chattooga co. to the Coosa in Cherokee co., Ala.

CHATTOOGA, a N. W. county of Georgia, bordering on Alabama, and intersected by the Chattooga river; area, 360 sq. m.; pop. in 1870, 6,902, of whom 1,503 were colored. The surface is diversified by valleys and mountains connected with the Blue Ridge. The principal summits are Taylor's ridge, John's mountain, and Dirtseller mountain. Limestone, marble, iron, and lead are abundant. The chief productions in 1870 were 58,232 bushels of wheat, 145,403 of Indian corn,

17,802 of oats, and 901 bales of cotton. There were 803 horses, 1,094 milch cows, 2,110 other cattle, 3,623 sheep, and 8,732 swine. Capital, Summerville.

CHAUCER, Geoffrey, an English poet, born probably in London in 1328, died there, Oct. 25, 1400. Sharon Turner, however, suggests that the year 1340 is more likely to have been that in which Chaucer was born than 1328. The principal events of his life are tinged with uncertainty. Leland represents him to have studied both at Cambridge and at Oxford, and at the latter place to have diligently frequented the public schools and disputations, and even there to have affected the opinions of Wycliffe in religion. Tyrwhitt doubts his having studied at either university. He appears to have been entered at the Inner Temple; but the evidence of this is stated to rest simply upon the record of one Geoffrey Chaucer having been fined two shillings for beating a Franciscan friar in Fleet street. Leland states that he engaged in the practice of the law, while Mr. Tyrwhitt contests the point. He had undoubtedly early ingratiated himself into the friendship of persons of distinction, was a page to King Edward III., and was rewarded by that monarch in 1367 with an annuity of 20 marks, equivalent to about £200 of present money. These facts are verified by public documents appended to the biography by Godwin. He appears afterward to have become gentleman of the bedchamber to the king, and in 1370 was sent abroad as a royal envoy. Two years later he was sent to Genoa, with two other ambassadors, to negotiate for ships for a naval force; and it appears that his success was so great as to win many proofs of royal favor. He was made on his return partial comptroller of the customs of London, and was allowed to receive daily from the butler of England a pitcher of wine. In 1377 he is referred to by Froissart as an English envoy employed on the continent on secret service. The object of this mission, according to the same authority, was a treaty of peace and a marriage of the king's grandson, afterward Richard II., with the French princess Mary. Neither of these aims was accomplished, and Edward dying in June of the same year (1377), there was an end of this great patronage. In the mean time the poet and diplomatist had married one of the maids of honor to the queen, Philippa Rouet, whose sister, the widow of Sir Hugh Swinford, became first the mistress and then the wife of John of Gaunt, "time-honored Lancaster." This high connection obtained for Chaucer a continuation of royal favor under the new king, Richard II., and he was commissioned upon several urgent matters in various parts of the kingdom. For the safe prosecution of these unknown errands, the king granted him a species of safe conduct, or protection from arrest or injury. After Richard's deposition in 1399, all his donations to Chaucer were immediately

confirmed by Henry IV., who, being the son of the duke of Lancaster, stood somewhat in the light of nephew to the poet. Toward the close of 1399 we find Chaucer taking a lease of a residence in the garden of the priory of Westminster. The foregoing facts rest upon official documents appended to the life of Chaucer by Godwin. Other events, less authentic, are gleaned from passages in his works. As an adherent of the duke of Lancaster, he embraced the opinions of Wycliffe, and formed a close connection with that divine. Persecution and reverses followed in consequence of this. Godwin refers his personal misfortunes to his support of a Wycliffian candidate for the mayoralty of London, John of Northampton, who was arrested and imprisoned. Chaucer escaped to the continent, where, during some years in France and Denmark, he wrote many of his books. He suffered much privation meanwhile from the faithlessness of agents who appropriated his income, and was at length induced to return secretly in hopes of recovering his dues. He was discovered and arrested, but at length obtained pardon and liberty by disclosing the designs of the men with whom he had been associated. This drew upon him a flood of obloquy, which he appears to have attempted to parry by offering an appeal to arms. He was certainly thereafter received again into royal favor; and expressions of remorse are discoverable in his subsequent writings, although somewhat vaguely. Soon after these events he removed from the turmoil and intrigues of public life into literary retirement. His first retreat was at Woodstock, and finally, upon the death of the duke of Lancaster, at Donnington castle, where an aged and favorite oak tree, under whose branches the poet often meditated, long afterward bore his name. It was here that he wrote his most remarkable and latest work, the "Canterbury Tales." Their general plan is of a company of pilgrims on their way to Canterbury assembling at an inn, and agreeing each to tell a tale in going and returning; he who should tell the best tale to be treated by the others with a supper at the inn. In this work Chaucer is considered to have improved upon his model, the "Decameron" of Boccaccio, especially in variety of character and delicacy of discrimination; but the introduction or introductory machinery is contrived with less felicity. This work, in verse, begun in declining years, was left incomplete. Chaucer's command over the language of his day, and his exhibition of existing character and passing incident, constitute his attraction. His early works bear the stamp of the corrupt tastes of his age, but are everywhere remarkable for delineation of character. The "Romaunt of the Rose" is professedly a translation of the French *Roman de la rose*. "Troilus and Cresseide," his second poetical essay, taken chiefly from Boccaccio, contains passages of much pathos and beauty. The story

of "Queen Annelida and False Arcite" was acknowledged by the author to have been taken from *Stace* and *Corinne*. The opening is from Statius, but *Corinne* has not, we believe, been identified. The opening of the "Assembly of Fowles" is founded upon the *Somnium Scipionis* of Cicero. The "House of Fame" has been supposed to have been originally a lay of Provence; but this idea has been combated by Tyrwhitt, whose studies of Chaucer were profound. This commentator suggests a doubt of the "Flower and the Leaf" being from the pen of Chaucer, which Dryden modernized without expressing a suspicion of its authenticity. It was printed for the first time in Speght's edition of Chaucer in 1598. The prose works are a translation of Boëthius, the "Treatise on the Astrolabe," and the "Testament of Love." The translation of Boëthius, and occasional quotations from Juvenal and Seneca, prove that he retained an acquaintance with the Roman classics. It is impossible to ascertain the exact chronology of his works. He left by his wife two sons, Thomas and Lewis, the first of whom was speaker of the house of commons in the reign of Henry IV., and was ambassador to France and Burgundy; and a daughter, Alice, who married the duke of Suffolk. He was buried in Westminster abbey, being the first poet there interred. A century and a half after his death a monument was erected there to his memory by Nicholas Brigham.—The principal biographers and editors of Chaucer are Speght, Leland, Tyrwhitt (5 vols. 8vo, London, 1798), and Godwin (2 vols. 4to, London, 1803). Some of his poems have been modernized by Dryden, Pope, Wordsworth, Leigh Hunt, R. H. Horne, and Elizabeth Barrett Browning. In C. C. Clarke's "Riches of Chaucer" (2 vols., 1835) the best pieces are given with only the spelling modernized. The Chaucer society published in 1868 an edition of the "Canterbury Tales," giving the six principal texts.

CHAUCI, one of the most powerful tribes of ancient Germany. They dwelt between the rivers Ems and Elbe, being divided by the Weser into *Majores* on the west and *Minores* on the east. According to Tacitus, their country was extensive and thickly peopled. They were distinguished for their love of justice and of peace, being powerful but unambitious, never provoking war, but always ready to repel aggression. They were allies of the Romans in the war of Germanicus against the Cherusci, but subsequently their enemies in the reigns of Claudius and Nero. They are last mentioned in the 3d century as devastating Gaul. They were finally merged in the general name of Saxons.

CHAUDES-AIGUES (Lat. *Aquæ Calentes*), a watering place of Auvergne, France, in the department of Cantal, 26 m. E. by S. of Aurillac; pop. in 1866, 1,948. It is situated in a narrow and picturesque gorge, and derives its name from some hot springs in its vicinity,

which are extensively used for baths, for washing fleeces, and for warming the houses during the winter. The so-called mineral springs, four in number, consist almost entirely of pure water of a high temperature. The annual attendance of visitors is about 500. The spring called *Source du Par*, one of the hottest springs in Europe, has a temperature of 177° ; the others vary from 135° to 162° . Woollen goods and hosiery are manufactured in the town.

CHAUDET. I. Antoine Denis, a French artist, born in Paris, March 31, 1763, died April 19, 1810. His statue of Edipus, exhibited in 1801, established his reputation as a sculptor. Among his other works are "Paul and Virginia," "Sensibility," "Surprise," the silver statue of "Peace" in the Tuileries, the "Napoleon" which previous to 1815 surmounted the column in the Place Vendôme, and the bass relief of "Painting, Sculpture, and Architecture," in the Musée Napoléon. He excelled also as a painter and designer, and illustrated Didot's edition of Racine and other works. He was professor of sculpture, and contributed many written articles to the dictionary of the academy. His works tended to modify the classicism which prevailed in the French schools of art in the beginning of the present century.

II. Jeanne Elisabeth Gabiou, wife of the preceding, born in 1767, died about 1830. A pupil of her husband, she painted a "Child teaching a Dog to read," and many little pictures of the kind, and excelled also as a portrait painter.

CHAUDIÈRE, a river of the province of Quebec, Canada, rises near the boundary line between Canada and the United States, and flows into the St. Lawrence about 7 m. above Que-

bec, the water, first contracted by salient points of rock, is then thrown over a precipice from a height of 100 ft. An iron bridge for the Grand Trunk railway is thrown across it near its mouth, where the banks are high. The scenery on the banks of this river is very picturesque. —In the Ottawa river, at the city of that name, is another cataract called Chaudière falls. (See OTTAWA.)

CHAUDON. I. Dom Louis Maienl, a French author, born at Valensolle, May 20, 1737, died at Mezin, May 28, 1817. He studied in the colleges of Marseilles and Avignon, and entered the order of Benedictines. His principal work, the *Nouveau dictionnaire historique* (Avignon, 1766), was designed to be equally removed from the prolixity of Moréri and the dryness of Ladvocat. It was the basis of the subsequent and distinct work of Feller. He wrote *Leçons d'histoire et de chronologie*, and *Dictionnaire anti-philosophique*; and for other works which he composed in defence of religion he received honorable briefs from Clement XIII. and Pius VI.

II. Esprit Joseph, a French author, brother of the preceding, born at Valensolle in 1738, died in 1800. After teaching the humanities in several colleges of the Oratorians, he published in 1772, at Avignon, a valuable bibliographical work, entitled *Bibliothèque d'un homme de goût*, many materials of which were furnished by his brother. In 1778 he published in Paris a *Dictionnaire interprète-manuel des noms latins de la géographie ancienne et moderne*.

CHAUFFEPIÉ, Jacques Georges de, a Protestant divine of Holland, of French origin, born in Leeuwarden, Nov. 9, 1702, died in Amsterdam, July 3, 1786. He is principally known as the author of the *Nouveau dictionnaire historique et critique, pour servir de supplément ou de continuation du Dictionnaire historique et critique de M. Bayle* (4 vols. folio, Amsterdam, 1750-'56).

CHAUFFEURS, or **Garrotteurs**, a class of brigands during the reign of terror in France. Their headquarters were first in the forest of Orgères, near the city of Chartres, and afterward they infested other parts of the country in bands, organized under the leadership of Johann Bückler, sur-

named Schinderhannes, till 1803, when the measures adopted under the consulate put a stop to their depredations. They garrotted their victims, and tortured and burned (*chauffer*) their feet to make them disgorge their treasures. While engaged in burglaries they



Chaudière Falls.

bec. Its length is about 120 m., and its usual width is from 400 to 600 yards; but it is often contracted by rocks jutting from either side, which occasion violent rapids, and render the stream unnavigable. About $2\frac{1}{2}$ m. from its mouth are the falls of the Chaudière, where

put a black veil over their faces, or blackened them with soot.

CHAULIAC, Cautiac, or Chaulien, Gui de, a French surgeon of the 14th century, studied at Montpellier and Bologna, practised his profession in Lyons, and was afterward employed by three popes of Avignon, Clement VI., Innocent VI., and Urban V. He is the author of a remarkable treatise on surgery, entitled *Inventarium, sive Collectorium Partis Chirurgicæ Medicinæ*, which was translated into French by Laurent Joubert, under the title of *Grande chirurgie*, and accompanied with annotations and an index by his son Isaac Joubert (8vo, Lyons, 1592). This was the first work of importance on the principles and practice of surgery published in Europe after the middle ages, and during two centuries it was considered the classical work on that branch of science. It is even now esteemed for its simplicity and clearness on many points. Plasters and poultices, ointments and embrocations were almost the only resources of surgical practice in western Europe before the time of Chauliac. He reestablished the practice of such operations as had been described and performed by the ancient Greeks and the Arabian surgeons, invented several new instruments, and undertook certain operations on the crystalline lens, for the restoration of sight, in cases of cataract. He laid the foundations of the modern principles and practice of surgery; and though his works are tinged with astrological notions, they are replete with practical instruction. He also wrote a description of the plague which visited France in 1348, and by which he was himself attacked.

CHAULIEU, Guillaume Amfrye de, a French poet, born at Fontenay in 1639, died in Paris, June 27, 1720. By his associates he was called the Anacreon of France, and by Voltaire the first of neglected poets. The best edition of his works appeared in 1774, in 2 vols. 8vo. His *Lettres inédites* were published in 1850.

CHAUMETTE, Pierre Gaspard, a French revolutionist, born at Nevers, May 24, 1763, guillotined in Paris, April 13, 1794. He was the son of a shoemaker, but ran away from home, and became cabin boy and steersman on a river vessel. In 1789 he was a lawyer's clerk at Paris, and became a journalist and popular revolutionary orator. He was engaged in the insurrection of Aug. 10, 1792, and in September was appointed procureur of the commune, in which capacity he vindictively prosecuted Louis XVI. and his family. He got up those fêtes in which everything sacred and decent was profaned in the name of reason. He took part in the movement of May 31, 1793, which overthrew the Girondists, and later he joined Hébert and Anacharsis Clootz in a conspiracy against the Mountain, as too lenient toward the aristocrats. His atheistic speeches and popular excesses alarmed even Danton and Robespierre, and the conspiracy being discovered, its authors were arrested March 13, 1794, and Hébert and Clootz were executed.

Chaumette, whose popularity made him formidable, was not imprisoned at that time, but some days after was brought before the tribunal, condemned, and executed. His memory was execrated by all parties.

CHAUMONOT, or Chaumonnot, Pierre Marie Joseph, a French missionary, born near Châtillon-sur-Seine in 1611, died at Lorette, near Quebec, Canada, Feb. 21, 1693. In early life he entered the society of Jesus in Rome, and was sent at his own request as a missionary to the North American Indians. In company with Père Poncet he landed at Quebec in 1639, and devoted himself to the instruction of the Hurons, Petuns, and Neutrals. He resided among these tribes until the Hurons were dispersed by the Iroquois, when he accompanied a small body of fugitives to Quebec in 1650. In the following year he removed with the Hurons to Isle Orleans, where a Christian settlement was formed. In 1655 he visited the Onondagas, but returned to his flock in 1658, and was instrumental in founding the mission of Notre Dame de Foye, five miles from Quebec. This establishment was removed to Lorette in 1693, and soon after Père Chaumonot closed his career after more than half a century of hardships. He left an excellent grammar of the Huron language, published by the literary and historical society of Quebec in 1835; a list of radical and derivative words, a catechism, and a series of instructions, all in the same language, and a memoir of his own life addressed to his superior. These last have not been published.

CHAUMONT, or Chaumont-en-Bassigny, a town of France, capital of the department of Haute-Marne, about 1½ m. from the confluence of the Marne and the Suize, 133 m. S. E. of Paris; pop. in 1866, 8,285. It has a departmental college and a public library of 37,000 volumes. There is a triumphal arch begun by Napoleon I. and finished by Louis XVIII. The manufacture of iron wares forms the leading indus-



Castle of Chaumont.

try; but there are manufactories of woollens, linen and cotton yarn, and a considerable trade in iron wares, grain, and skins. The allied powers concluded a treaty here against Napo-

leon, March 1, 1814, which afterward became the basis of the holy alliance.

CHAUNCEY, Isaac, an American naval officer, born at Black Rock, Conn., Feb. 20, 1772, died in Washington, Jan. 27, 1840. He commenced his career in the merchant service, in which he became distinguished for seamanship, enterprise, and energy. He entered the navy as lieutenant in 1799, and early in 1802 was appointed acting captain of the frigate *Chesapeake*, of 38 guns, the flag ship of a squadron ordered to the Mediterranean, under the command of Commodore Valentine Morris, to operate against Tripoli. He served actively during a large part of the war with Tripoli, and also in the squadrons of Commodores Preble and Rodgers, in command of the *John Adams*, of 28 guns. In the brilliant operations before Tripoli in 1804 he bore a distinguished part. In that year the grade of master commandant (afterward commander) was reestablished in the navy, and he was one of eight lieutenants promoted to it. In April, 1806, he was advanced to the rank of captain. In the war of 1812 the naval superiority on the lakes became an object of high importance, and Commodore Chauncey, then in command of the navy yard at New York, was appointed to command on all the lakes except Champlain. On Oct. 6, 1812, he arrived at Sackett's Harbor, and entered upon his duties. In 1813 he coöperated with the land forces in the capture of York (now Toronto), and also of Fort George, which led to the evacuation by the British of the whole Niagara frontier. During the summer of that year he was engaged in watching the enemy and superintending the ship building at Sackett's Harbor. On Sept. 27 Chauncey succeeded in engaging the British squadron in York bay, which resulted in the retreat and pursuit of the latter. On Oct. 5 he captured five of the enemy's vessels with part of a British foreign regiment. On Aug. 9, 1814, he appeared off Kingston and blockaded the squadron of Sir James Yeo for six weeks, and held the command of the lake until the close of navigation. Peace was concluded before operations could be commenced in the ensuing spring. During his subsequent career he commanded the navy yard at New York at different times; also the squadron in the Mediterranean, and with William Shaler, consul, negotiated a treaty with Algiers. He also served upon the board of navy commissioners, to the presidency of which he was appointed in June, 1833, and held this position at the time of his death.

CHAUNY. **I. Charles**, second president of Harvard college, born in Hertfordshire, England, in 1592, died Feb. 19, 1672. Educated at Westminster and Cambridge, he made the acquaintance of Archbishop Usher, and was appointed professor of Hebrew, and afterward of Greek, at Cambridge. Leaving that position soon after, he took the vicarage of Ware, Hertfordshire. His stern Puritanism involved

him in a difficulty with the ecclesiastical judicatories on the publication of the "Book of Sports," and the introduction of railing out the communion table. He was imprisoned and fined for his denunciation of these acts of the church, and recanted, but soon repented of his recantation. He therefore determined to embark for New England, where he arrived June 1, 1638. Here he was reordained, and for three years remained in Plymouth as assistant pastor, and then became pastor at Scituate, Mass. There he remained until the change in the ecclesiastical polity of England, when he resolved to return to his vicarage in Ware, which had invited him home. But the first president of Harvard college, Mr. Dunster, having resigned, the office was offered to Mr. Chauncey, accepted (1654), and held until his death. He published sermons (1655-'9), and *Antisynodalia Americana* (1662). **II. Charles**, an American clergyman, great-grandson of the preceding, born Jan. 1, 1705, died Feb. 10, 1787. He graduated at Harvard college in 1721, and was ordained pastor of the first church in Boston in 1727, as the colleague of Mr. Foxcroft. He was a copious writer, and published many works; among the rest a "Complete View of the Episcopacy," being the substance of a discussion with Dr. Chandler of New Jersey; "Seasonable Thoughts on the State of Religion in New England;" "Discourse on Enthusiasm;" "Remarks on the Bishop of Llandaff's Sermon;" "Mystery hid from Ages, or the Salvation of all Men;" and "The Benevolence of the Deity." He was for 60 years the minister of one parish. **III. Charles**, an American jurist, born at Durham, Conn., June 11, 1747, died in New Haven, April 28, 1823. He was admitted to the bar in 1768, and removed to New Haven. He was made attorney for the state of Connecticut in 1776, and judge of the superior court in 1789. In 1793 he retired to private life. He was not college bred, but was a good scholar and a clear-headed man. He taught jurisprudence for 40 years. **IV. Charles**, an American lawyer, son of the preceding, born in New Haven, Aug. 17, 1777, died Aug. 30, 1849. He removed to Philadelphia after completing his studies, and was admitted to the bar in 1799, where he soon held a divided honor of precedence with John Sargeant and Horace Binney. The various honors of state and judiciary which were tendered to him he declined. He was a man of great erudition, of winning manners, and of unimpeachable integrity.

CHAUNY, a town of France, in the department of Aisne, partly built on an island in the river Oise, which is here connected with the canal of St. Quentin, situated on the Northern railway (from Paris to Cologne), 66 m. N. E. of Paris; pop. in 1866, 9,080. The town derives its principal commercial importance from the glass works of St. Gobain, which are about 7 m. distant. It has manufactories of cotton fabrics, soda, and sulphuric and muriatic acids.

CHAUS. See **LYNX**.

CHAUSSARD, Pierre Jean Baptiste, a French author, born in Paris in 1766, died there in 1823. He had achieved considerable reputation as a jurist and scholar at the outbreak of the revolution, in which he took an active part under the name of Publicola. He was appointed commissioner in Belgium, but his arbitrary proceedings led to his speedy return to Paris. For a short time he held several local offices, and from 1803 to 1815 he was professor in various towns. The restoration depriving him of employment, he continued to write on a great variety of subjects. The best of his works is *Épître sur quelques genres dont Boileau n'a point fait mention dans son Art poétique* (1811), of which he published in 1817 a poetical version under the title of *Poétique secondaire*, &c. His most popular ode was *L'Industrie et les arts*. His works on Greek courtesans and on Heliogabalus have been censured on account of their superficial and licentious character; but his works on art, education, &c., enjoy a better reputation.

CHAUTAUQUA, the westernmost county of New York, bounded N. W. by Lake Erie, and W. and S. by Pennsylvania; area, about 1,000 sq. m.; pop. in 1870, 59,327. It is well supplied with water power, and drained by Cone-wango creek, its tributaries, and several other smaller streams. Chautauqua ridge passes through the county. Between this ridge and the lake, a distance of from 3 to 10 m., the surface is nearly level, and the soil very fertile. The country around the streams is also extremely productive. Iron ore, marble, and sulphur springs have been found in several places. There are springs emitting carburetted hydrogen, the gas from some of which has been successfully employed in lighting houses. The Erie, the Atlantic and Great Western, the Lake Shore, the Buffalo, Corry, and Pittsburgh, and the Dunkirk, Warren, and Pittsburgh railroads traverse the county. The chief productions in 1870 were 148,849 bushels of wheat, 254,110 of Indian corn, 755,451 of oats, 43,927 of barley, 314,873 of potatoes, 162,272 tons of hay, 773,830 lbs. of cheese, 5,049,037 of butter, 193,891 of wool, and 342,732 of maple sugar. There were 13,244 horses, 46,990 milch cows, 20,511 other cattle, 40,404 sheep, and 13,429 swine. There were 9 manufactories of agricultural implements, 53 of carriages, 13 of cheese, 18 of furniture, 8 of machinery, 2 of woollen goods, 1 railroad repair shop, 9 planing mills, 50 saw mills, 21 tanneries, 26 flour mills, 1 manufactory of cars, 1 of rectified coal oil, 1 of edged tools, 3 of hardware, 1 of pianos, 2 of paper, 23 of saddlery and harness, 5 breweries, and 9 currying establishments. Capital, Mayville.

CHAUTAUQUA ASSEMBLY. See supplement.

CHAUTAUQUA LAKE, a beautiful sheet of water in the centre of Chautauqua co., N. Y., 18 m. long and from 1 to 3 m. wide. It lies 1,290 ft. above the Atlantic and 730 ft. above

Lake Erie. Its outlet, which is navigable by small boats, opens into Alleghany river. The name is a corruption of an Indian phrase signifying a "foggy place," and was given in consequence of the mists which frequently rise from the surface of the lake.

CHAUVEAU, Pierre J. O., a Canadian statesman and author, born at Quebec, May 30, 1820. He received his education at the seminary in that city, and studied law. He first attracted attention as a writer in *Le Canadien* from 1838 to 1841. In 1844 he was elected to the legislature for the county of Quebec. He was solicitor general in 1851, and provincial secretary in 1853, holding the latter office till 1855, when he was appointed superintendent of education for Lower Canada. Under his administration of the school system normal schools were established, and the cause of education advanced. After the confederation was organized, he was first minister of the government of Quebec from 1867 to the beginning of 1873, when he became speaker of the senate of Canada. He has considerable literary reputation in Canada. His principal work is "Charles Guérin," a novel published in 1853, which gives a graphic picture of French-Canadian life and society. It was the first French-Canadian novel ever published.

CHAUVEAU-LAGARDE, Claude François, a French advocate, born at Chartres about 1760, died in Paris in February, 1841. He acted as advocate for Miranda, Brissot, Charlotte Corday, Marie Antoinette, and Madame Élisabeth. Soon after the condemnation of the queen he was arrested, and was not liberated till after the fall of Robespierre. He was advocate to the council of state under Napoleon, and was appointed to congratulate Louis XVIII. on his entrance into the capital. After the second restoration he devoted himself to the defence of the proscribed. Besides numerous speeches and political pamphlets, he published narratives of the trials of Marie Antoinette and Madame Élisabeth.

CHAUVENET, William, an American mathematician and astronomer, born in Milford, Penn., May 24, 1819, died at St. Paul, Minn., Dec. 13, 1870. He graduated with high honors in 1840 at Yale college, where his mathematical talents had already found an early recognition. He immediately became associated with Alexander Dallas Bache, his life-long friend and master in science, in delicate and important meteorological and magnetic observations at Girard college, Philadelphia. This connection continued till his appointment in 1841 to a professorship of mathematics in the navy. He promoted the establishment of the naval academy at Annapolis, the change in the system of educating naval officers, and the institution of the naval academy observatory, of which last he was at once appointed director. In 1859 he was called to the chair of mathematics and astronomy at Yale college and at the Washington university of St. Louis, Mo. Choosing the latter, he continued there till

1868, when ill health obliged him to resign his chair, to the duties of which had been added the chancellorship of the university. Many of his contributions to scientific knowledge were of great practical value, such as his methods of determining the longitude at sea, of rating chronometers, of great circle sailing charts, &c. His "Treatise on Practical and Spherical Trigonometry" (2 vols. 8vo, Philadelphia, 1863) was declared by Prof. Bond of Harvard college to be "the most thorough and complete which had appeared in any country or language." His other works include "The Binomial Theorem Theory of Exponents and of Logarithms" (1843); "Plane and Spherical Astronomy" (1850), a work following the methods of Gauss and Bessel; and "On Elementary Geometry" (1870).

CHAUVINISM, a term used in France denoting a fanatical adherence to an effete leadership or obsolete national aspirations. At the time of the disbandment of Napoleon's guards in 1815, many soldiers attracted attention by the coincidence of all bearing the name of Chauvin, and of all extolling the fallen emperor. Nicolas Chauvin, a brave but foolish grenadier, created especial merriment by his grotesque displays of attachment to his former chief, which were caricatured on the stage and in print. This is the generally accepted origin of the term, although some authorities seek to trace it to the French *chauve* (bald), and to connect with it an idea of senility and dotage.

CHAUX-DE-FONDS, La, a borough of Switzerland, in the canton and 9 m. N. W. of Neuchâtel; pop. in 1870, 19,930. It is a large scattered town, resembling an assemblage of farm houses and hamlets, a garden plot surrounding every cottage. It is situated in a rugged narrow valley of the Jura, at an elevation of more than 3,000 ft. above the sea. Great prosperity prevails among the inhabitants, mainly owing to the manufacture of clocks and watches, of which this place and the neighboring town of Locle are the chief seats. The number of persons employed in this manufacture in the vicinity is about 12,000, who produce annually 800,000 gold and silver watches, worth about \$7,000,000. In 1774 the number produced was about 300. The manufacture is not carried on in factories, but in the separate dwellings of the workmen, each of whom usually makes only one particular piece, leaving even the finishing of it to others. The inhabitants excel also in carving, jewelry, and enamelling, and in various other arts of the same kind, and in the manufacture of chemical, mathematical, and surgical instruments, and of lace. The painter Léopold Robert and the mechanicians Droz (father and son) were born at La Chaux-de-Fonds. There are here two subterranean mills, turned by the stream before it sinks into a deep chasm underground, the rocks having been blasted out to give space for the mills. The Doubs, which flows on the neighboring French frontier, trav-

erses a fissure in the limestone, and a few miles N. of Chaux-de-Fonds has a fall of 80 ft., below which for nearly 6 m. it runs between cliffs 800 or 1,000 ft. high.

CHAVEE, Honoré Joseph, a Belgian philologist, born in Namur, June 3, 1815. He was ordained in 1838, published in 1841 *Essai d'étymologie philosophique*, &c., and went in 1844 to Paris, where he became professor at the collège Stanislas and the Athénée. About 1855 he established there a school of comparative philology, and in 1867 the *Revue de Linguistique*. He left the priesthood after the publication of his *Lexicologie indo-européenne*, &c. (Paris, 1849), in which he supports the theory of the original plurality of races and languages. He also wrote *Moïse et les langues* (1855), and *Les langues et les races* (1862).

CHAVES (anc. *Aquæ Flaviæ*), a town of Portugal, in the province of Tras-os-Montes, 35 m. W. S. W. of Braganza; pop. about 7,000. The fortifications which once defended it are now in ruins. It is situated on the Tamega river, here crossed by a Roman bridge of 18 arches, and has hot saline springs and baths. It has an interesting church, the burial place of Afonso, duke of Braganza. On March 12, 1809, after a violent conflict, Soult obtained possession of the place; and after the defeat of the Cartistas (Sept. 18, 1837), the convention of Chaves was signed here.

CHAVES, Manoel de Silveira Pinto de Fonseca, marquis of, and count of Amarante, a Portuguese general and statesman, born at Villa Real, died in Lisbon, March 7, 1830. He was opposed to the Portuguese liberals, and on the arrival of the duke of Angoulême in Spain in 1823, he raised the standard of revolution in Portugal in favor of Dom Miguel and absolutism. He was proclaimed a traitor, and being defeated by Gen. Riego, he retired into Spain. There he continued to carry on his intrigues, and on the death of John VI. in 1826 he returned to Lisbon. He performed a conspicuous part in the disturbances which followed, and underwent the vicissitudes of exile and return, always retreating after his numerous defeats over the Spanish frontier. To put an end to the intrigues of the Portuguese refugees with the Spanish court, the English, who were favorable to the constitutional cause in Portugal, declared that any participation in the struggle by the Spanish authorities would be regarded as a *casus belli*. To avoid this risk, Chaves was sent away from the frontier. Subsequently, after Dom Miguel had been installed as regent, February, 1828, Chaves returned to Portugal and assisted the usurper in seizing the crown for himself. This accomplished, he was neglected, and soon afterward retired from court, disgusted with the ingratitude of Dom Miguel; and the latter part of his life was spent in gloom and obscurity, still more saddened by partial insanity.

CHAZAL, Antoine, a French painter and designer, born in Paris in 1793, died there in

1854. He devoted himself especially to the painting of flowers and fruit, and designed and engraved many plates for works on natural history, anatomy, &c.; among which are the *Traité des accouchements* by Maygrier, the *Ovologie humaine* by Velpeau, the *Embryogénie comparée* by Coste, the *Anatomie pathologique* by Cruveilhier, and the *Flore des Canaries* by Webb. He made also 40 studies of medicinal plants in aquarelle for the medical school in Lexington, Kentucky. In 1835 he was named professor of design in the museum of natural history in Paris. He painted for the museum many of the wild animals after nature, and some genre pictures and portraits, among the latter one of Washington.—His son, CHARLES CAMILLE, born in Paris in 1826, is also a painter of some note.

CHEATHAM, a N. W. county of Tennessee, intersected by Cumberland river; area, 350 sq. m.; pop. in 1870, 6,678, of whom 1,470 were colored. The surface is undulating. It is traversed by the Nashville and Northwestern railroad. The chief productions in 1870 were 19,572 bushels of wheat, 274,052 of Indian corn, 44,585 of oats, 62 bales of cotton, and 419,265 lbs. of tobacco. There were 1,450 horses, 1,529 milch cows, 2,732 other cattle, 4,825 sheep, and 14,980 swine. There were 12 saw mills and a manufactory of gunpowder. Capital, Ashland City.

CHEAT RIVER, in West Virginia, is formed by the union of the Laurel, Glade, Shaver's and Dry forks, which rise among the Alleghany mountains, near the N. border of Pocahontas co., and meet in Tucker co. It flows N. and N. W. through a hilly country, well adapted to grazing, and rich in coal and iron, and falls into the Monongahela at the S. W. extremity of Fayette co., Pa. It furnishes fine water power, and is navigable 40 m. above Rowlesburg, but not in its lower course.

CHEBOYGAN, an extreme N. county of Michigan, bordering on the straits of Mackinaw and Lake Huron; area, about 500 sq. m.; pop. in 1870, 2,196. It is drained by Black and Cheboygan rivers, and contains several lakes. The chief productions in 1870 were 1,070 bushels of wheat, 8,285 of oats, 8,484 of potatoes, 1,267 of peas and beans, and 349 tons of hay. The total value of live stock was \$20,585. There were 2 ship-building establishments and 6 saw mills. Capital, Duncan.

CHECKERBERRY. See PARTRIDGE BERRY, and WINTERGREEN.

CHÉDOTE, a Norman navigator, the dates of whose birth and death are unknown. On account of his thorough knowledge of the coasts of New France he was selected in 1598 to guide thither the expedition of the marquis de la Roche. On his arrival at Sable island he landed 50 men, the most of whom were from the French prisons, and departed to examine the coast of Acadia. He was prevented by stress of weather from landing on his return, and the men remained on the island for seven years, leading the life of savages. In 1605 the parliament of

Rouen sent him for them, and he recovered 12, all that remained. Arrived in France in a state of destitution, they were presented to Henry IV., who gave to each 50 crowns and a pardon.

CHEDUBA, an island in the bay of Bengal, belonging to the district of Ramree; area, about 400 sq. m.; pop. about 6,000. It was first occupied by the English in 1824. The channel between it and the mainland is navigable for small vessels. Copper, iron, and silver have been found in this island, and it affords indications of extinct volcanoes. It produces petroleum, rice, tobacco, pepper, sugar, cotton, hemp, and indigo.

CHEE-FOO, a town of China, and one of the last ports opened to foreign trade, in the province of Shantung, lat. 37° 30' N., lon. 121° 28' E.; pop. variously estimated from 25,000 to 80,000. The chief trade consists in tea pressed into cakes for the Russian market. A species of large delicious grape is cultivated here, though no wine is made.

CHEESE, the curd of milk, separated from the whey and compressed into a solid mass. It consists of the caseine and butter and a portion of the water and saline constituents of the milk, and whatever salt may be added in the manufacture. The proportion of butter is subject to the greatest variation, depending as it does upon the richness of the milk, and the quantity which may have been abstracted by skimming, or which, as in Stilton cheese, may have been added by taking cream from other milk. Caseine (from Lat. *caseus*, cheese) is the coagulable constituent, and belongs to the group of albuminoids or proteine compounds which compose the principal part of the nitrogenous material of plants and animals. It is found not only in milk, but in other animal fluids. According to Berzelius, Braconnot, and others, it has two modifications, one soluble and the other insoluble in water; but later investigations have shown that its solubility depends upon its combination with a portion of alkali, and as found in milk it may be regarded as a natural alkali-albumen, similar to that found in the blood. As analyzed by Scherer, it consists, after deducting the ash, of carbon 52.7, hydrogen, 7.2, and nitrogen 15.6. Walther and Verdeil found one part of sulphur. Mulder found 6 per cent. of phosphate of calcium, which is precipitated by adding an acid. It is concluded, therefore, that pure caseine can only exist in a soluble condition, and that when precipitated by coagulation it is deprived of a part of its constituents. The spontaneous coagulation of milk has been generally regarded as caused by the action upon caseine of lactic acid which has been formed by the fermentation of lactose or sugar of milk; but late investigations have created some doubt as to the extent to which lactic acid alope acts as the agent. Organic bodies have been found in new milk which are capable of being developed into a ferment, to which some have ascribed the power of causing caseine to coagulate. How far this ferment may act in

conjunction with lactic acid, or the extent of its agency in generating lactic acid, has not been determined. Moist caseine exposed to the air soon putrefies, yielding sulphide and carbonate of ammonia, and an oily body having a disagreeable smell, together with butyric and valeric acids, the undecomposed caseine dissolving in the ammonia which is formed. Caseine plays an important part in the making of cheese, although as a constituent its quantity is often less than that of butter. An analysis by Völcker of an average sample of good milk gave:

Water	87.30
Butter	3.75
Caseine	3.31
Milk sugar and extractive matter	4.86
Mineral matters (ash)	0.78
	100.00

The cheese which was made from this milk had the following composition:

Water	87.85
Butter	23.91
Caseine	25.00
Extractive matter, lactic acid, &c.	4.91
Mineral matter containing common salt	3.33
	100.00

—In cheese making, the coagulation of the milk may be effected in either of two ways: by adding an acid, which is done in Holland, or by subjecting the caseine to a peculiar fermentation induced by the action of rennet, which is the usual mode. Rennet is usually prepared from the fourth stomach of the calf, by salting and drying. The stomach should not be washed, but turned and carefully wiped with a cloth, sprinkled with salt, and dried at a moderate temperature in the open air, stretched upon a small hoop or forked stick. It is prepared for use by steeping it either in whey or brine. Whey is preferred for the reason that it more readily assists in inducing lactic acid fermentation; but it should first be freed from the albuminous matter which it contains, by boiling and straining. The steeping occupies about a week, during which time the rennets should be squeezed and rubbed to extract the active principle. A wooden vessel should never be used, as it is almost certain to impart putrefactive properties to the rennet which are injurious to the cheese, but the steeping should be done in earthen jars. The English method is to steep the rennets in a brine strong enough to bear an egg, adding six rennets, one sliced lemon, and an ounce of saltpetre to two gallons of brine. The brine liquor is usually prepared one or two months before it is used, as it is believed that this age improves its coagulating qualities. The theory of the action of rennet is not yet considered to be well established. Liebig, although admitting the necessity of the presence of a ferment to initiate by a catalytic force the fermentation of milk sugar and its conversion into lactic acid, rejects the theory of Pasteur that the process is the result of the constant development of a minute fungus

which has been called *micrococcus*. W. Hallier, however, following Pasteur, has found that newly made cheese contains numerous ferment nuclei, which he considers as a kind of putrefactive yeast. According to his investigations, these nuclei are developed, as are the nuclei of beer yeast, from spores of *penicillium*, differing from them only on account of the difference in the fluid which affords them nourishment. In beer the *penicillium*, according to Hallier, is developed into *cryptococcus*, while in fresh milk it is converted into *micrococcus*, and when the milk becomes sour into *arthrococcus*. He says that cows' milk contains ready-formed micrococcus cells, but that coagulation does not take place till the conditions for their development are favorable. The addition of rennet, which contains cells of a similar character ready to take on an active condition, produces a development of the micrococcus cells. Völcker and others have demonstrated by numerous experiments that milk is often coagulated by the action of rennet before it becomes sour; and although it is undoubtedly true that caseine owes its solubility to a combination with an alkali, it does not follow that that combination may not be broken up even while the fluid in which it is dissolved is alkaline. It cannot therefore be maintained that the coagulation of the caseine in the ordinary use of rennet is due to the action of lactic acid. When an acid is added to milk, it does not coagulate till there is decided acidity. It would seem therefore that the alkaline constituent of the caseine is not immediately abstracted, because of the slight acidity of the milk in which it is held in solution. It is not unlikely that the coagulation of caseine by rennet has much similarity to its coagulation by the gastric juice, which by a catalytic action has the power of coagulating soluble caseine, and of again dissolving it in a condition which Maible calls albuminose, as he does the digested product of all the albuminoids, but which Lehmann calls peptones. The juice of the gastric tubules never effects this transformation unless it contains a free acid, but it is possible that the mucous coat of the stomach when converted into rennet may possess the power of coagulating soluble caseine, although not of digesting it. The antiseptic properties of gastric juice are probably owing to the combined action of the pepsine and lactic acid, and it is not improbable that the development of lactic acid in cheese making arrests putrefactive fermentation upon the same principle. But whatever may be the result of the investigations that are in progress, it is admitted on all hands that the transformation of sugar of milk into lactic acid is hastened by the action of rennet, although coagulation of caseine may precede the lactic acid fermentation. (See FERMENTATION.) In the practice of cheese making the subject of ferments is one that requires to be constantly borne in mind if satisfactory results are to be secured. The spores of various fungi are con-

stantly floating in the air and attaching themselves to and developing in any matrix capable of yielding them nourishment; and as milk is one of the most delicately sensitive of all fluids, the most scrupulous cleanliness should exist in every part of a cheese dairy. The vessels for containing the milk and its products must always be scalded with boiling water as soon as they are emptied, and all the utensils should regularly be subjected to the same treatment. The pastures and all the food and drink of the cows ought to be free from all products of fungoid putrefaction or fermentation of whatever kind; therefore stagnant water or low, sour land should not be suffered in pastures devoted to the grazing of milch cows, and mouldy food should be strictly excluded from their diet. Most of the cheese in the United States is now made at factories, which are carried on by associations of farmers who employ a manager. The usual practice is to send the milk to the factory every night and morning, keeping it as cool as practicable during transportation.—The process of making cheese with the use of rennet which will now be described is that which is followed by the best cheese makers in this country, and is very nearly the same as that by which the celebrated Cheddar cheese is made, in Somersetshire, England. The evening's milk is placed in cooling vats so that it will be brought to a temperature of about 60° by the following morning, when the morning's milk is added and the temperature raised to 80°. This is effected in a manner the most efficient, at the same that it avoids overheating any portion of the milk. A large vat contains the milk, which is gently and equally heated by a water bath, which receives its heat from the circulation of warm water furnished from a cylindrical reservoir heated by a concentric flue placed beneath the vat, or by water contained in a coil of pipe, and heated in a fire box near by. When the milk has reached 80° a sufficient quantity of rennet is stirred into it to produce coagulation in about 40 minutes. It is customary with the Cheddar cheese makers to add sour whey in quantity according to the condition of the milk, adding little or none if any acidity has been developed in it. The whey is used for the purpose of hastening the development of lactic acid, because it is then found that there is less liability to that species of fermentation which results in gaseous and other objectionable products. It is a practice that has not been general in this country, but many of the best cheese makers are now adopting it. When the curd has become sufficiently firm, which may be known by its dividing with a smooth fracture when the finger is passed through it, it is cut with curd knives, one set of which have perpendicular and the other horizontal blades, into small cubes of from a quarter to a half inch in diameter. The contraction of the curd then takes place more rapidly, expressing the whey; and in about 20 minutes it becomes

quite firm, when it is broken up by means of an instrument called a wire shovel breaker into smaller pieces, and the temperature is raised to 98°, the contents of the vat being gently stirred to prevent packing of the curds upon the bottom. When the curd has become sufficiently firm for the operation, and the whey has attained a certain degree of acidity, conditions which can be learned only by experience, it is drawn off by a large spout as rapidly as possible, and the curd is heaped in one end of the vat, which is elevated to facilitate the draining. Exposure to the air hastens the development of lactic acid. In 15 or 20 minutes the particles of curd will have become coherent and form a partially solid mass, which is then cut into pieces and turned over and left until firm enough to break into pieces without danger of expressing the buttery particles, which would be the case if the process were attempted too soon. It is then taken out, placed in a cooler, broken into thin flakes, and spread out to cool still further. In about 20 minutes it is turned over and left until it attains a peculiar mellow and flaky condition, well known to the experienced cheese maker. By this time its temperature has been reduced to about 70°, and it is put into a hoop and pressed gently for 10 or 15 minutes, to express more of the whey, by which a too rapid fermentation is prevented. It is then taken out and cut and broken into pieces about the size of peas by means of a curd mill, after which it is salted. In England 1 lb. of salt is used to 56 lbs. of curd; but in the United States more salt is used—from 2½ to 3 lbs. to 100 lbs. of curd—partly because American dairy men do not drain their curds or express the whey from their cheeses as much as the English. The changes that produce the aroma and flavor of cheese may be produced in less time, or at least may to a certain extent be imitated, by using a large amount of salt and keeping the curing rooms warm. The flavor, however, is always rendered inferior by such means, and irritating and unwholesome properties are engendered. After the salt has been well incorporated the curd is again put into the hoop, a cloth being placed upon the top and bottom, and sometimes around it. It is kept under pressure for 20 or 24 hours, and is then taken out, and any sharp edges that may have been made in pressing pared off. It is then turned and placed in the press again, and generally, especially if the cheese is a large one, bandaged, and kept there for one or two days longer. In many of the factories in this country, however, only 24 hours is allowed for pressing, because of the number that are made. The temperature at which it goes to press is a matter of great importance, because if too high, fermentation with evolution of gas is liable to take place and make the cheese porous. The temperature at which Cheddar cheese goes to press is between 60° and 65°. Care should be taken during the operation that the buttery particles are not

squeezed out, and at the same time the retention of too much whey should be avoided, as that will injure its keeping properties. Much of the excellence of the Cheddar system lies in the proper management of the conditions which affect the different processes of the manufacture. The following are the chief points requiring attention: 1, the early initiation of lactic acid fermentation by using, when indicated, sour whey; 2, the employment of sufficient heat to cause the curds to contract and express the whey; 3, such an exposure to the air as will to the proper extent convert the micrococcus into arthrocooccus cells, or which will, upon any theory, carry the formation of lactic acid to that degree which, with proper care, will prevent future putrefaction; and 4, to cool the curds enough to prevent loss of butter in pressing. After the cheese is pressed it is taken to the curing room, rubbed with melted fresh butter, and turned over once a day until it is ripened. The curing room should be dimly lighted, to avoid flies as well as the chemical action of light, and sufficiently ventilated to keep the air pure. The temperature should be well regulated, being kept for the most part at about 70° both in summer and winter. A higher degree produces too rapid ripening, and below 60° the necessary chemical changes will not take place. It sometimes happens that the milk when it is poured into the vat has some taint that will cause it, after the rennet is added, to take on a fermentation which will result in gaseous products and an offensive flavor and smell. This condition of the milk may be caused by the overheating of the blood of the cows, or from their having partaken of improper food. The effect will be, unless the difficulty is anticipated, the production of what is called floating curds, in consequence of the reduction of their specific gravity by the bubbles of gas. This floating occurs when the curds are broken and the temperature is raised previous to drawing off the whey. When this phenomenon is seen to be taking place, the temperature of the vat should be raised to 100° to cause greater contraction of the curds, and after the whey is drawn off the draining and exposure to the air should be continued longer than usual in order to develop an increased amount of lactic acid. This will be likely to arrest the putrefactive fermentation, and to get rid of the obnoxious products which have already appeared. When a bad condition of the milk is known or strongly suspected, it should be aerated and cooled as much as possible before going into the vat, and enough more rennet than usual should be used to produce coagulation in 30 minutes, and a larger quantity of sour whey than usual should be stirred in at the same time.—Some very fine cheeses are made in England by skimming the night's milk and adding it to that of the morning. Such are often called skim-milk cheeses, although the term more strictly applies to those made of milk all of which has been skimmed, leaving

only a small percentage of butter. Some made in Wiltshire and Gloucestershire of partly skimmed milk are said by Dr. Völcker to compare favorably with good Cheddar, the deficiency in butter being made up by other good qualities. It is the opinion of many good cheese makers that milk may be too rich in butter for the best quality of cheese that will keep well. If nearly all the cream is skimmed from milk, it will not be possible to make it into good cheese, at least by the ordinary English process. At creameries and in the butter-making districts in this country, as well as in England, the making of skim-milk cheeses is practised to a certain extent. The process differs but little from that of making whole-milk cheeses; but as they do not ripen or cure as soon or as evenly, they are made smaller and thinner.—The coagulation of milk by means of hydrochloric acid, as it is practised in Holland in making the most excellent cheeses, deserves more attention than it has hitherto received in other countries. The process is attended with much less difficulty than when rennet is employed, and the coagulation is more complete, yielding an increased product. All the butter is retained in the curd, and the danger of after fermentation is also greatly diminished by avoiding the use of fungous ferments, whose control is always more or less difficult. The principal objection seems to be an ascribed want of flavor, which among most cheese fanciers, especially in England, requires to be somewhat gamy. The Dutch cheese has a sharp taste and high keeping qualities, and notwithstanding it may lack what is called mellowness, its flavor is preferred by many. It probably possesses the advantage of being less liable than cheese coagulated by rennet to contain deleterious or poisonous principles.—There are more varieties of cheese made in Europe than in America, which may be in part attributed to the greater attention which is paid there to economy in food. They may be classified into cream cheeses, whole-milk cheeses, and skim and sour milk cheeses. To the first class belong Neufchâtel, Vascerein, Brie, cream Cheddar, and Cotherstone. Neufchâtel is made of pure cream thickened by heat and compressed in a mould. It is made at Neufchâtel-en-Bray, a small town in the department of Seine-Inférieure, France, 25 m. N. E. of Rouen. It is esteemed as a great delicacy, but, from the difficulty of preserving its good qualities, can scarcely be appreciated far from the locality where it is made. Brie, which is also a French cheese, and the Vascerein of Switzerland, are also made of the purest cream. Both Neufchâtel and Brie cheeses are now largely made in the state of New Jersey, and can be brought to the New York and Philadelphia markets in a better condition than if imported. Stilton and cream Cheddar are made by adding the cream of one milking to the whole milk of the next, in the proportion of one quart of cream

to ten quarts of milk. After stirring, the mass is put into a tub in which a linen strainer has been laid. Coagulation is produced by rennet, the curd is cut into cubes, and without breaking is carefully lifted into a strainer, to allow the whey to drain off, after which it is placed in a hoop seven or eight inches in diameter and eight or nine inches high, having a follower pierced with holes at each end. When fitted, the hoop is placed upon a shelf and turned four or five times a day, the only pressure applied being its own weight. When sufficiently firm, which can only be known by experience, it is bandaged and taken to a curing room whose temperature is about 70°, where it receives its salting, which is performed externally and not by salting the curds. After a time it is sometimes placed in a warmer room for the purpose of developing blue mould, which gives it a peculiar value to some cheese fanciers. Of the second class, or whole-milk cheeses, Cheddar, Cheshire, best Gloucester, and Wiltshire of England, Gouda and Edam of Holland, Gruyère of Switzerland, and most of the American cheeses are examples. The famous Gruyère cheese, made in the canton of Fribourg, Switzerland, which is said by the Swiss to have been the first cheese made by the factory system, is of whole milk, which, to the amount of 100 or more gallons, is heated while fresh in a caldron to blood heat, and rennet added to effect coagulation in about half an hour. The curd is then sliced with a knife and broken with a blunt stick armed with wooden pins, and the heat raised to about 135°. Stirring is continued half an hour after, by which time the curd is divided into small, elastic pieces of the size of peas. A strainer cloth is then drawn under the curds, and they are laid upon a rack to drain, after which they are placed in a peculiar hoop, formed of a thin piece of board bent into a circle, with the ends lapping, but left free to slide over each other to allow the cheese to spread in pressing. The press is a simple lever loaded with a weight at one end. The salting is done after the pressing, the cheese hoop being replaced after each application of salt for a few days, to preserve the form. Jura cheese, made in the Alps, is much like the Gruyère, and they are both known in this country as *Schweitzerkäse*. A factory for making it is established in Oneida co., N. Y., which uses the milk of more than 200 cows; and it is also made in Ohio. It is said, however, that the American Gruyère lacks the flavor of the Swiss, because of difference in the grass upon which the cattle feed. The process for making Parmesan, the cheese of Parma, is said to be precisely similar to that for Gruyère, the difference in the cheese being that the Parmesan is made of skimmed milk. Sour-milk cheeses are made in various parts of Europe. They are often of an inferior quality in consequence of the improper manner in which they are made and the extent to which the fermentation is carried.

Cottage cheese is nothing more than newly prepared curd, drained, broken, slightly pressed, and salted to suit the taste, and is usually eaten in this condition. If kept for some time at a warm temperature, putrefactive fermentation takes place, and ammoniacal gases of an offensive odor are given out. There are persons whose palates are pleased with this product, and it is erroneously supposed by some that this is genuine Dutch cheese. Properly cured sour-milk Dutch cheese is as free from offensive odors as Cheddar, the fermentation having been carefully conducted until all gaseous products cease to be formed; a sharp, clean-flavored, appetizing condiment is the result. It is sometimes flavored with sage and other garden herbs. Roquefort, a French cheese, is made of goats' or sheep's milk; after coagulation by rennet, the curd is subjected to great pressure, and the cheeses are bandaged with coarse cloths and placed on shelves to dry, after which they are taken to caves, where the bandages are removed and they are salted. In 15 or 20 days they become covered with mould, which is scraped off with a knife, the operation being repeated every fortnight for two months, during which the color of the mould is said to be successively white, green, and red, the last color indicating that they are fit to use. *Schabziegerkäse* is made in the canton of Glarus, Switzerland, of curd which has been fermented. It is mixed with the pulverized dried flowers of *Schabziegerklee* (*melilotus caruleus*, not *M. officinalis*, as is sometimes stated), and pressed in a mould. It is usually eaten grated, spread upon buttered bread, and has a sharp and peculiar flavor much relished by many. In Limburg, Belgium, a cheese is made which is eaten while in a high state of putrefaction. Large quantities are also made in New York, Ohio, Illinois, and Wisconsin. Oneida, Lewis, and Jefferson counties are the principal seats of its manufacture in New York. In 1872, as nearly as can be estimated, about 20,000 boxes were made, of 100 lbs. each, containing from 50 to 60 "bricks," each weighing from 1½ to 2 lbs.—Annatto, a vegetable coloring matter of an orange red, is often used to color cheese; but it is a disagreeable substance, whose use should not be encouraged. (See ANNOTTO.)—Cases of poisoning by cheese are not infrequent, and have lately been sufficiently investigated to show that they are analogous to sausage and salt meat poisoning, and take place from the use of cheese which has been hastily cured, and generally when considerable salt and warmth had been employed. The cases are usually not fatal, but present symptoms of all degrees of violence. It is natural to suppose that a proteine body like casein, in the presence of fats, would be likely to generate during fermentation substances of a character highly irritating to the mucous membrane, and therefore great caution should be observed in the use of cheese which has an unpleasant odor. Cheese, either new or old,

is not an easily digestible article of food, but when well made is not unwholesome, and may sometimes suitably form quite a large share of the diet of laborers. For further practical and theoretical information, see Willard's "Practical Dairy Husbandry" (New York, 1872), and Watts's "Dictionary of Chemistry."—According to the census, the whole amount of cheese produced in the United States in 1870 was 162,927,382 lbs., of which 109,435,229 lbs. was made in factories and 53,927,382 lbs. on farms. The principal states producing cheese were New York, 100,776,014 lbs.; Ohio, 24,153,856; Vermont, 7,814,879; Illinois, 5,734,004; Massachusetts, 4,131,309; and California, 3,395,074. There were 1,313 factories devoted to the manufacture of cheese, employing 4,607 hands. The capital invested amounted to \$3,690,075; wages paid during the year, \$706,566; gallons of milk used, 116,466,405; value of all materials used, \$14,089,284; of cheese produced, \$16,710,569; other products, \$61,096. The number of cows supplying one factory ranges from 100 to more than 1,000, the average being about 400. In 1871 a factory in Chautauqua co., N. Y., had registered as the whole number of cows, 1,734. During the year ending June 30, 1873, 66,204,024 lbs. of cheese, valued at \$7,752,918, were exported from the United States, of which 52,056,926 lbs. went to England, and 8,428,396 to Germany.

CHEESHAHTEAUMUCK, Caleb, an Indian, graduate of Harvard college (1665), born in 1646, died at Charlestown, Mass., in 1666. He was the only Indian who ever graduated from that college.

CHEEVER, Ezekiel, an American teacher, born in London, Jan. 25, 1615, died in Boston, Aug. 21, 1708. He was the son of a linen draper, and the pure Latinity of some essays and verses written by him in 1631, and which are still extant among his manuscripts, shows that he had enjoyed superior opportunities of classical training. He came to America in 1637, landing at Boston, and in the following year accompanied Davenport and Eaton to Quinnipiac, and assisted in founding the colony of New Haven. His name appears on the plantation covenant in June, 1639. He was chosen one of the deacons of the church soon after its organization, occasionally officiating as a preacher. He taught a public school there from the foundation of the colony in 1638 till 1650, and represented the town in the general assembly in 1646. He was master of the grammar school in Ipswich, Mass., in 1650-'51, when he took charge of the free school in Charlestown, where he taught nine years. In 1670 he was called to Boston to take charge of the free school, now known as the Latin school. In this invitation the governor, magistrates, clergymen, and selectmen of Boston united. He remained at the head of this school for 38 years, and died at the age of 93, "retaining," says Cotton Mather, who preached his funeral sermon, "his

abilities in an unusual degree to the very last, his intellectual force as little abated as his natural." While teaching at New Haven Mr. Cheever prepared the "Accidence, a short Introduction to the Latin Tongue," which in 1785 had run through 20 editions, and was for more than a century the hand-book of the Latin scholars of New England. He was also the author of a little treatise entitled "Scripture Prophecies Explained, in three short Essays."

CHEEVER. **L. George Barrell**, D. D., an American clergyman and author, born at Hallowell, Me., April 17, 1807. He graduated at Bowdoin college in 1825, at the Andover theological seminary in 1830, and was ordained pastor of the Howard street Congregational church, Salem, Mass., in 1832. While at Andover and Salem he contributed in prose and verse, on literary and theological topics, to the "North American Review," "Biblical Repository," and other periodicals. He engaged in the Unitarian controversy, in connection with which he wrote a defence of the orthodoxy of Cudworth. Espousing the temperance cause, he published in a Salem newspaper, in 1835, a dream entitled "Deacon Giles's Distillery," in which the liquors were graphically characterized as containing demons in an *inferno*. The article was widely circulated with illustrations as a temperance tract. Deacon Giles was deemed a veritable person, and the publication resulted in a riotous attack upon Mr. Cheever in the street, his trial and conviction for libel, and his imprisonment for 30 days in the Salem jail. He resigned his pastorate the next summer, and passed the following 2½ years in Europe and the Levant, contributing letters to the "New York Observer." On his return in 1838 he became pastor of the Allen street Presbyterian church, New York, and soon after delivered lectures on the "Pilgrim's Progress," and on "Hierarchical Despotism." He went again to Europe in 1844, as corresponding editor of the "New York Evangelist," of which journal he was principal-editor for a year after his return, in 1845. In 1846 he was installed over the new Congregational church of the Puritans in New York. Upon the establishment of the "New York Independent" in 1848, Dr. Cheever became a weekly contributor to it of religious, literary, critical, and political articles. He also contributed scholarly papers to the "Bibliotheca Sacra." Among his works are commonplace books of prose and poetry (1828 and 1829); "Studies in Poetry" (1830); an edition of the "Select Works of Archbishop Leighton" (1832); "Lectures on the Pilgrim's Progress" (1844); "Wanderings of a Pilgrim" (1845 and 1846); "Journal of the Pilgrims at Plymouth, New England, in 1620, reprinted from the original volume" (1848); "Windings of the River of the Water of Life" (1849); "Voices of Nature" (1852); "Powers of the World to Come" (1853); "Lectures on the Life, Genius, and Sanctity of Cowper" (1856); "God against Slavery"

(1857); and "Guilt of Slavery and Crime of Slaveholding" (1860). **II. Henry Theodore**, an American clergyman and author, brother of the preceding, born at Hallowell, Me., in 1814. He graduated at Bowdoin college in 1834, and in 1835-'6 was a correspondent from Spain, France, and Louisiana of the New York "Evangelist." He afterward studied theology at Bangor, visited the Sandwich Islands, and was successively minister of Congregational churches at Lodi, N. J., in New York, at Greenport, L. I., at Jewett City, Conn., and since 1864 at Worcester, Mass. He was secretary and agent of the church anti-slavery society from its origin in 1859 to its close in 1864. He has published "Life in the Sandwich Islands" (1850); "Memorials of Nathaniel Cheever, M. D." (1851); "Memoir of Walter Colton" (1852); "The Pulpit and the Pew" (1858); "Tracts for the Times" (1859); "Way Marks in the Moral War with Slavery" (1861); and several volumes of travel and adventure among the islands of the Pacific, for the young.

CHEHALIS, a W. county of Washington territory, bordering on the Pacific, and watered by the Kwautli river and the Chehalis and its tributaries; area, 1,600 sq. m.; pop. in 1870, 401. Gray's harbor, a capacious and landlocked bay, is in this county. Timber is abundant, and the soil is very fertile. The chief productions in 1870 were 3,345 bushels of wheat, 3,345 of oats, 9,860 of potatoes, 746 tons of hay, and 21,890 lbs. of butter. There were 129 horses, 505 milch cows, 1,145 other cattle, 847 sheep, and 293 swine. Capital, Montesano.

CHEIROPTERA. See BAT.

CHEIROTHERIUM. See LABYRINTHODON.

CHEKE, Sir John, an English scholar, born at Cambridge, June 16, 1514, died Sept. 13, 1557. After distinguishing himself as a classical scholar at St. John's college, Cambridge, he was selected to fill the new professorship of Greek founded by Henry VIII. In this position he labored to restore the original pronunciation of Greek, in which he was thwarted by Bishop Gardiner, then chancellor of the university. In 1544 he was appointed, with Sir Anthony Cooke, tutor to Prince Edward, and he appears also to have had the princess Elizabeth under his care. When Edward VI. came to the throne he rewarded him by lucrative offices in the church, caused him to be elected provost of King's college, and made him commissioner to revise the ecclesiastical laws, gentleman of his household, knight, and in 1553 clerk of the council, privy councillor, and one of the secretaries of state. On the king's death he supported the movement that placed the crown for a few days on the head of Lady Jane Grey. For this, on Queen Mary's accession, he was sent to the tower, but was pardoned after a year's imprisonment. Foreseeing evil days, he obtained permission to sojourn on the continent, and fixed his residence at Strasburg, where he was prominent in the services of the English church established

there. This gave offence to the powers in England; his property was confiscated, and he was compelled to teach Greek for a livelihood. In 1556 he was inveigled, through the means of the British minister, to Brussels, to meet his wife. On returning he was arrested on a slight charge, and was conveyed to England, where the queen sent Feckenham, dean of St. Paul's, to convert him, with the alternative of going to the stake if impenitent. Cheke's constancy gave way. He made a public recantation; but, being compelled to assist at the condemnation of Protestants, he died of vexation and remorse, and was buried in St. Alban's church. He wrote several learned religious works in Latin. His only English composition is a pamphlet published in 1549, entitled "The Hurt of Sedition, how Grievous it is to a Commonwealth." He left several works in MS., among them a translation of Matthew's Gospel into words derived mainly from Saxon roots; also a plan of spelling words by sound, almost similar to that since developed as phonography. He is, however, chiefly distinguished for the impulse he gave to the study of the Greek language and literature. Strype's "Life of Cheke" appeared at London in 1705.

CHEKIANG, an E. province of China, bordering on the Pacific, and including the Chusan archipelago, between lat. 27° and 31° N., and lon. 118° and 123° E., traversed by the great canal, the Tsientang and other rivers; area, about 40,000 sq. m. According to Chinese authorities, the population in 1864 was 26,756,784. Baron Richthofen (Shanghai, 1871) concedes an aggregate population of barely 6,000,000, of whom 2,000,000 live in the five chief cities. But his estimate does not seem to be corroborated. Chekiang is among the most fertile and prosperous regions of China; and a large business is transacted in the principal ports, Ningpo and Hangchow, which are open to foreign commerce. The staple export is silk. The green tea country is situated near the Tsientang river, W. of Ningpo, and tea is extensively exported, as well as cotton, indigo, camphor, coal, and fruit. Gold and silver stuffs, paper, and fermented liquors are manufactured and largely exported. Hangchow is the capital, but the governor general of the two provinces of Fokien and Chekiang had his official residence in 1871 at Foochow, the capital of Fokien.

CHELARD, Hippolyte André Jean Baptiste, a French composer, born in Paris, Feb. 1, 1789, died in Weimar, Feb. 12, 1861. The son of a musician, he studied in Paris, Rome, and Naples, and his first comic opera, *Casa da vendere*, was performed in the latter city in 1815. In 1816 he became a violinist at the grand opera in Paris, and a music teacher. The above mentioned opera was produced at the Italian theatre in 1816, and *Macbeth*, a lyrical opera in three acts, at the grand opera in June, 1827. Although Rouget de Lisle wrote the libretto, and the trio of the witches and the choruses produced a great dramatic effect, the opera was not

successful in Paris; but Chelard having added an act, and produced a German version, it was favorably received in Munich in 1828, and the king of Bavaria appointed him chapelmaster. Having returned to Paris to meet with new failures, he went back to Munich in 1830, and thence to London as leader of the German opera (1832-'3). In 1836 he went to Weimar as chapelmaster. Here in 1848 he was thrown into the shade by Liszt. Having been pensioned in 1852, he made in 1854 a not very successful attempt in Paris, and soon afterward he went back to Weimar. His productions were much more popular in Germany than in France. His best opera is the *Herrmannsschlacht*, first produced in 1835.

CHELMSFORD, Frederick Thesiger, baron, an English lawyer, born in London, July 15, 1794, died Oct. 5, 1878. His father was a collector of customs in the island of St. Vincent. He entered the navy, and served as midshipman during the bombardment of Copenhagen in 1809; but his father's West India estate having been destroyed by a volcanic eruption, he retired from the naval service to study law. He was called to the bar in 1818, became one of the most brilliant leaders of the home circuit, and in 1834 king's councillor. He was returned to parliament in March, 1840, in the conservative interest. He was solicitor general in 1844-'5, attorney general 1845-'6, and again in 1852, and lord chancellor from February, 1858, to June, 1859, and from June, 1866, to February, 1868. In 1858 he was raised to the peerage as Baron Chelmsford, and he is one of the leaders of the conservative party in the house of lords. He married a niece of Major Pierson, who fell at Jersey in 1781.—His elder son, **FREDERICK AUGUSTUS**, born in 1827, distinguished himself in the Crimea, India, and Abyssinia, and was appointed in 1868 aide-de-camp to the queen and adjutant general to the forces in India.

CHELSEA, a city of Suffolk co., Massachusetts, separated from Charlestown on the S. W. by Mystic river, which is crossed by Chelsea bridge, 3,300 ft. long. It is connected with Boston by the Eastern railroad, and also by horse railroad by way of Charlestown and Chelsea bridge. Winnisimmet ferry, the most ancient in the United States, dating from 1631, runs from the foot of Winnisimmet street, Chelsea, to the foot of Hanover street, Boston, a distance of about $1\frac{1}{2}$ m. The Grand Junction railroad also passes through the city. Chelsea beach, in Revere, an adjoining town, about 5 m. from Boston, is about 3 m. long, and is much resorted to in summer. The growth of Chelsea has been steady since 1830. In that year the population was 770; in 1840, 2,390; 1850, 6,701; 1860, 13,395; 1865, 14,403; 1870, 18,547. The principal public buildings are the city hall, the naval hospital, connected with the navy yard at Charlestown, the marine hospital, the academy of music, the masonic and odd fellows' halls, and Winnisimmet hall.

The city is included in the Boston customs district, and most of its inhabitants do business in that city; but there is some manufacturing, the principal establishments being a woollen mill, a brass foundry, an iron foundry and machine shop, an establishment for casting furnaces, ranges, and stoves, one manufactory each of linseed oil, table salt, fire brick, rubber goods, boot and shoe stiffenings, brooms, chairs, carriages, chewing gum, marble work, washing machines, mattresses, and paper boxes, three each of oil and varnishes, soap, bricks, varnishes and japan, and worsted goods, and one brewery. There is a national bank, with a capital of \$300,000, and a savings bank, with deposits in 1871 amounting to \$590,736. In 1872 the valuation of property was \$16,707,343; total taxation, \$277,055 48; city debt, \$1,262,700, of which \$1,057,800 was funded. In 1871 there were 3,092 houses in the city. Chelsea is divided into four wards. The government is vested in a mayor, a board of aldermen consisting of two from each ward, and a common council of 19 members. The police duty is performed by a city marshal and 19 assistant marshals, and there is a police court. The fire department is under the charge of a chief engineer and two assistant engineers, and has two steam engines, a hook and ladder company, and three hose companies. The Chelsea water works are under the charge of three commissioners. The water is brought from the Mystic water works in Charlestown, and was first introduced in 1867. The principal charitable institutions are the Winnisimmet benevolent society and the ladies' union relief society. In 1872 the city appropriated \$4,896 28 for the support of the poor. The school committee, consisting of two members from each ward, has under its control a high school and 3 grammar and 12 primary schools. In 1871 there were 4 male and 58 female teachers, and an average attendance of 2,800 pupils. The free public library, which was opened Jan. 1, 1870, contains about 6,000 volumes. There are also two circulating libraries and a weekly newspaper. There 13 religious societies, viz.: 2 Baptist, 2 Congregational, 1 Episcopal, 2 Methodist, 1 Roman Catholic, 1 Unitarian, 1 Universalist, 1 Second Advent, 1 Spiritualist, and 1 Christian band. Chelsea was settled in 1630, and was called Winnisimmet. It was a part of Boston till 1738, when with two other places it was organized as the town of Chelsea. It was incorporated as a city in 1857.

CHELSEA, a parish and parliamentary borough of England, on the left bank of the Thames, formerly a village about 2 m. from London, but now a portion of its suburbs, belonging to the county of Middlesex, and constituting a part of the hundred of Ossulston; pop. of Chelsea district in 1871, 71,086, and of the borough, 258,011. It derives interest from the celebrated military asylum for invalid soldiers known as Chelsea hospital, erected here by Sir Chris-

topher Wren in the reign of Charles II., who laid its foundation stone, Feb. 16, 1682. It was completed in 1690 at an expense of £150,000. It accommodates upward of 500 resident pensioners, besides whom there are about 70,000 out-pensioners. The annual expenditure for the maintenance of this establishment is about £1,000,000. The body of the duke of Wellington lay in state in Chelsea hospital for a few days previous to the funeral (November, 1852). The royal military asylum for the support and education of children of soldiers (especially orphans), with accommodations for 1,000 boys and girls, is in Chelsea. A children's hospital was opened in 1866. Prominent among the educational institutions are a normal school for males and one for females. Adjoining the military hospital are the botanical gardens of the apothecaries' company, occupying four acres on the bank of the river. The old parish church forms the termination to a long grove called Cheyne walk; and the churchyard contains monuments to Sir Thomas More and Sir Hans Sloane. A beautiful suspension bridge completed in 1858, 915 ft. in length including abutments, connects Chelsea with Battersea. The steamboat traffic is accommodated by three piers. In 1871 was laid the first stone of the embankment on the N. side of the Thames. Cremorne gardens in Chelsea are a favorite popular resort. In 1867 Chelsea was constituted a borough, comprising also Fulham, Hammersmith, and Kensington, entitled to two members of parliament.

CHELTENHAM, a market town and parliamentary borough of Gloucestershire, England, on the river Chelt, 86 m. N. W. of London; pop. in 1871, 44,519. It is celebrated as a fashionable watering place. It lies in an extensive valley open to the south and west, but sheltered on other sides by an amphitheatre formed by the Malvern, Cotswold, and Leckhampton hills. The scenery on every side is noted for its picturesque beauty. Excepting a large railway carriage and wagon manufactory, the town has no manufactures, and but little trade beyond supplying the wealthy invalids who make it their residence, and whose houses and villas adorn the suburbs and surrounding country. The place possesses the usual attributes of a fashionable resort: assembly rooms, theatre, reading and billiard rooms, club house, literary and philosophic institute, horticultural and choral societies, cricket ground, race course, &c. The parochial church of St. Mary's is an ancient Gothic structure, in the decorated style, cruciform in shape, with a tower rising from the intersection of the cross, and with a lofty octagonal spire containing a peal of eight bells. There are 19 other churches and chapels, and numerous educational and benevolent institutions. Among the former is a free grammar school founded in 1578. Cheltenham proprietary college was erected in 1843, and is attended by over 600 students. The college building is an imposing specimen of the Tudor

collegiate style, with a frontage of 240 ft. There are four springs: the Royal old well, Montpelier spa, Pittville spa, and Cambray spa, with numerous baths. The water is a saline



Cheltenham College.

acidulous chalybeate, its main constituents being chloride of sodium, sulphate of soda, sulphate of magnesia, carbonic acid, and carbonate of iron, and is esteemed in bilious ailments. The first spring was discovered in 1716, but it was not till 1788, when George III. visited the town for his health, that it became a place of fashionable resort. Since then its growth has been very rapid.

CHEMISTRY, the science which investigates the composition and certain properties of material substances. Nothing is certainly known of the derivation of the term, but it is most probably from *Xημία* (*Chemia*), the original name of Egypt, in which country it is supposed to have originated; hence it was called the Egyptian art. Others derive it from *χημική* or *χημική*, relating to juices; hence the word was formerly written chymistry. The oldest author who mentions it is Julius Maternus Firmicus, in the reign of Constantine, about A. D. 340. Suidas defines chemistry as the making of gold and silver; Libavius, in 1595, as the art of making chemical preparations and of extracting the pure essences in a separate form from mixtures; Lémery, in 1675, as the art which treats of separating the different substances which occur in mixtures; Bergman, in the latter part of the 18th century, as the science which investigates the components of bodies in regard to their nature, their properties, and the manner in which they are combined; Macquer, about the same time, as the science which makes known to us the nature and properties of all bodies by composing and decomposing them. To the last two definitions, which express quite fully the ideas of chemists of the present day, may be added that of Berzelius: "Nature is composed of certain elementary bodies or elements. The knowledge of these bodies, of their mutual combinations, of the forces by which these combinations are brought about, and of the laws in accordance with which these forces act, constitutes chemistry."—Chemistry is often incorrectly spoken of as a science of recent origin. This view may be readily disproved. It would be impossible to determine at what exact period

it became so far developed as to deserve the name of science. Many chemical facts must have been known from the earliest times. As far back as history goes they are treated of. Only by the gradual collection and explanation of such facts could chemistry become a science. The Egyptians possessed considerable chemical knowledge. The smelting of ores and working of metals must have been brought to a high degree of perfection among them; otherwise many of their works of art, still existing, could not have been made. Their skill in dyeing implies a knowledge of the necessary chemicals and mordants. They also made glass, even colored, and knew how to prevent the decomposition of dead animal matter. The priesthood evidently possessed more or less knowledge of pharmaceutical chemistry. The Phœnicians dyed, made glass, and imported tin. The Israelites seem to have obtained some chemical knowledge, especially relating to metallurgy, during their sojourn in Egypt; they were acquainted with gold, silver, copper, tin, lead, and iron. The Greeks in the time of Homer seem to have had only what chemical knowledge they had derived from the Egyptians and Phœnicians. The metaphysical direction of the Greek mind was not calculated to advance the science by experimental investigations. They attempted, on the other hand, to explain the composition and origin of matter by philosophical speculations, as seen in the discussions regarding the elements, some five or six centuries before Christ. The views advanced by Aristotle on this subject long exerted a great influence on the science. He considered substances to be the result of the mixture of several fundamental properties, and their components or elements only as bearers of these properties, not at all as material, undecomposable substances which could be extracted experimentally. According to Aristotle these properties are those evident to the senses, viz.: hot, cold, dry, wet, heavy, light, hard, soft, &c. He recognized only the first four of these, because the others are less general and for the most part only secondary results of the union of the preceding. Hence his conclusion that there are four fundamental properties, hot, cold, dry, and wet, which characterize the four elementary conditions of matter, or elements, fire, air, earth, and water, of which all substances are composed, and from which their peculiarities are derived. He admits that each element possesses two of these properties at the same time, and since no element can have at once two totally opposite properties, cannot be simultaneously wet and dry, only four combinations are possible. Thus, simultaneous dryness and heat form fire; heat and moisture, air; cold and dryness, earth; cold and moisture, water. The Romans derived some chemical knowledge from other nations. They were acquainted with the metals previously mentioned, also with mercury, the power of which to dissolve gold they made use of in gilding. They knew of various alloys, of steel,

glass, vinegar, and soap. Their knowledge of dyeing was less than that possessed by the Egyptians.—Although but little is known of the progress of chemistry from the 1st to the 4th century A. D., it is probable that much of the knowledge which had long been kept secret by the Egyptian priests was now published and taught at Alexandria. Previous to the latter period chemistry had consisted only of a collection of empirical facts without intimate connection or definite purpose, upon which no theoretical views of any kind had been founded. It has been a peculiarity of chemistry, that while preserving its name and connection as a science it has had temporarily, at various times, special objects in view, to the attainment of which all its energies were directed for the time, while what is now regarded as the true aim of the science was used only as a means of obtaining the desired result. Such a period now commenced. It was characterized by the purpose which the science served, as well as by a theory upon the composition of the metals. All chemical facts were now studied under a certain connection for the purpose of solving a given problem: how to convert base metals into noble, as iron or lead into silver or gold. This idea is first mentioned by Greek authors of the 4th century, who speak of it as a thing already well known. It probably originated with the Egyptians, from whom it passed to the Arabs when they overran Egypt in the 7th century. From the middle of the 8th century the Arabs paid much attention to chemistry. From them its study passed through Spain into northern Europe. The purpose was still the transmutation of metals, the discovery of the philosopher's stone, the touch of which would convert mercury into gold, and at a later period also regarded as capable of curing all diseases. The first chemical theory appears in the 8th century. It consisted essentially in this: All metals are composed of two constituents, upon the relative quantity and purity of which the nature of the metal depends. These components were called sulphur and mercury. Although not possessing all the properties of ordinary sulphur and mercury, they derived their names from these last, which were supposed to contain a large proportion of them, but their properties were nevertheless different. The sulphur and mercury of the alchemists must be regarded, therefore, as conventional elements, deriving their names from certain analogies which they bore to ordinary sulphur and mercury. By mercury, undecomposability appears to have been understood; it was also regarded as the cause of metallic lustre and of malleability; by sulphur, on the contrary, decomposability was understood; these terms referring to the behavior of substances when subjected to fire, at that time regarded as the most powerful chemical agent. The various metals were supposed to be composed of these two bodies in different quantities, degrees of purity and of fixity (affinity?). The fusibility

of the metals was considered to depend upon the fixity of these ingredients; their color upon the relative amount of sulphur which they contained. The author of this theory is unknown. It is fully developed in the writings of the Arab Geber, who refers it to the ancients. It experienced but slight alteration till toward the end of the alchemical period, when the idea of salt was added to those of mercury and sulphur. Among the Arabs, physicians were the principal chemists, many of them being highly scientific men. The writings of Geber, in the latter half of the 8th century, indicate the amount of chemical knowledge which they then possessed. He describes the metals very accurately, and mentions the different degrees of affinity which mercury has for gold, silver, lead, tin, and copper. He knew how to convert metals into oxides by means of heat, and how to purify native sulphur by solution in alkaline lye, and reprecipitation by vinegar. Several metallic sulphides were also known to him, as well as the fact that metals increase in weight and change color when heated with sulphur. The Arabs, unlike some of their predecessors, did not consider simple change of color in a metal to be transmutation. They demanded an entire change of its properties—that it should be made like some other metal. Transmutation was regarded by them in the light of a scientific problem as yet unsolved. Their knowledge of salts was comparatively extensive, alum, saltpetre, sal ammoniac, and green vitriol being accurately described. The carbonates of the fixed alkalies, and the use of lime to render them caustic; the preparation of sulphuric acid by the distillation of alum; of nitric acid by the distillation of saltpetre and green vitriol; the preparation of strong acetic acid from vinegar, and of *aqua regia* from nitric acid and sal ammoniac, are all described by Geber. By means of the acids thus obtained, artificial salts were prepared, as nitrate of silver and bichloride of mercury; gold was also dissolved. They purified their preparations by distillation, by recrystallization, and by sublimation. The purification of the noble metals by cupellation, the use of the water bath, and processes of filtration, were also known. Several words still in common use, as alkali, alcohol, &c., originated with them. Geber himself published a special work on the construction of chemical furnaces.—The importance of the Arabs as chemists ceased with the 12th century; not, however, before they had awakened in other nations an enthusiasm for the science. During the 13th century it had spread over the greater part of northwestern Europe. The views of Albertus Magnus, who flourished in Germany during the 13th century, will serve as an example of those of his day. Believing fully in the transmutation of metals, he considered it easier to convert them into each other when their properties are analogous. Thus gold can be more readily made from silver than from any other metal, for the mixture of which it is com-

posed is very similar to that which forms silver. Indeed, it would only be necessary to change the color and weight of the latter, in order to obtain gold. He admits that different species of bodies cannot be converted one into the other. The metals, however, he regarded as mere varieties of one and the same species, being all composed alike. His views concerning this composition are essentially the same as those of Geber, but he believed that, besides sulphur and mercury, the metals must contain water, to the cold of which their solidity is due, seemingly mingling a portion of Aristotle's doctrine with that of Geber. The knowledge of practical chemistry detailed in his works is in advance of that possessed by Geber. For example, he describes the separation of silver from gold by means of nitric acid; a method of preparing metallic arsenic; and observed that sulphur attacks all metals, except gold, when heated with them. Contemporary with Albertus lived Roger Bacon, a most able diffuser and promoter of chemical science. At the same time, Raymond Lully made many new and important observations, but introduced an obscure style of writing, and fell into many absurdities, like those which soon became characteristic of alchemy. The transmutation of metals was now no longer spoken of as a possibility, but as a well established fact. In the 14th century alchemy had become diffused over the greater part of the civilized world. It was, however, especially among the priesthood that its followers were to be found, in spite of its prohibition by a bull of Pope John XXII. in 1317. In the latter part of the 15th century flourished Basil Valentine. In addition to the elements, sulphur and mercury, of the earlier alchemists, he mentions salt. From these three substances he supposes that not only metals but all substances are composed. He first clearly described bismuth and zinc; prepared antimony and several new salts; also muriatic acid, by distilling common salt with green vitriol. He knew how to precipitate copper from its solutions by means of iron, also gold by means of mercury, and had much general knowledge of precipitation. With him qualitative analysis first appears. He detected iron in many specimens of hard tin, copper in the brittle iron of Hungary, and silver in the copper from Mansfeld. He explains how a similar occurrence of the noble metals in the base metals of commerce may have given rise to many of the so-called transmutations of false alchemists.—The great impulse given to all branches of learning by the remarkable events of the 15th century had its effect on chemistry. The overthrow of the Byzantine empire, which scattered many of its learned men over western Europe, the invention of printing, and, above all, the growing tendency of men to think for themselves, were of peculiar importance to it. The implicit confidence hitherto placed in noted authorities began to diminish, and their theories to be questioned. The ground was made ready for a new

system. This was inaugurated by Paracelsus, in the first quarter of the 16th century. It fills a well defined period in chemical history, enduring till the middle of the 17th century. The views regarding the transmutation of metals remained unchanged, but gold-making was no longer the chief aim of the leading chemists. Indeed alchemy, as an art, soon became separated from chemistry. The characteristic of this period was the intimate connection between medicine and chemistry, the whole purpose of the latter being to cure disease. As its purpose was thus elevated, it passed into the hands of educated men, through whom the amount of chemical knowledge was rapidly increased. Paracelsus regarded sulphur, mercury, and salt as the elements of all substances, organic and inorganic. His ideas of sulphur and mercury correspond with those of the earlier alchemists, while that of salt is opposed to that of mercury, the former being typical of solidity and incombustibility, while the latter is expressive of volatility without decomposition. Besides giving a great impulse to the science, Paracelsus introduced numberless chemical preparations into use in medicine, rendering them familiar to physicians and apothecaries, whence the latter were often induced to occupy themselves with the study of chemistry. The controversies between the followers of Paracelsus and his adversaries also excited great interest in the science. At this epoch Agricola (1490-1555) flourished in Saxony. Standing aloof from the great chemical questions of the day, he occupied himself almost exclusively with metallurgy, in which specialty he became very distinguished by his writings. He first describes clear processes of smelting metals and of assaying ores. He may also be regarded as the founder of this branch of chemical science. Distinguished among the opposers of the mystical style of the alchemists, and for his exposition of their charlatanism, was Libavius (died 1616). Many valuable observations are also due to him. He prepared sulphuric acid by burning sulphur with salpetre, and proved its identity with the acid obtained by roasting green vitriol or alum. By distilling tin with corrosive sublimate he prepared bichloride of tin, still known as the fuming liquor of Libavius. The ideas concerning elements entertained by Van Helmont (1577-1644) differ essentially from those of preceding chemists. He rejected the four elements of Aristotle, for fire is not a substance; heat and cold are only abstract qualities, and not material things; therefore fire cannot be contained in any substance as a material component. He denounced, on the other hand, the elements of the alchemists, sulphur, mercury, and salt, and especially the theory that they were elements of the animal body, in proof of which, according to him, no facts existed. He regarded water as the chief ingredient of all things. It could be obtained by burning any combustible body. From it all parts of vegetables are formed, their

earthy as well as combustible portions. In proof of this, Van Helmont made the following experiment: A willow twig weighing 5 lbs. was planted in a pot containing a known quantity of thoroughly dried earth; this was covered to protect it from dust, and watered daily with rain water during five years. The willow, meanwhile, grew large and strong, weighing 164 lbs., although the earth in the pot, when again dried, had only lost 2 oz. This was regarded as proof positive that water alone forms plants and the mineral matters contained in them, while animals obtain their components directly from plants. Van Helmont introduced the term gas into chemistry, described several different kinds of gases, and distinguished them from vapors. As the practical chemist of this period, Glauber (1604-'68) stands preëminent. By improving the processes of preparing the mineral acids, by the discovery of salts, and by observing many new facts, he did great service. By synthesis he obtained a knowledge of the composition of many substances. It is worthy of remark that, during the latter half of the 17th century, Tachenius made the first approximately correct quantitative chemical statement which occurs in the history of the science, viz.: that metallic lead when burned to red lead increases its weight by $\frac{1}{15}$. In the latter half of the 17th century the foundation of several learned societies promoted and advanced the study of chemistry as well as of the other sciences.—During the continuance of this period of intimate connection between chemistry and medicine a great amount of chemical knowledge had been collected; the metals and their compounds were well known, as were the three principal mineral acids and their combinations with the alkalies. Toward its close a mass of observations, the material with which the structure of modern chemistry has been reared, invited explanation and classification. Important views were at this period advanced by Boyle (1626-'91). He first treated the question of elements from the same point of view as has been taken by modern chemists. He proved more clearly than any of his predecessors that the four elements of Aristotle were inadmissible, and how little the elements of the alchemists were calculated to afford a rational conception of the composition of bodies. He thought that, rather than seek to explain the primary elements of matter, which admit of various views, attention ought to be specially directed to those ingredients which can be separated and isolated as such. If these cannot be further decomposed, they should be called elements, although he admits that they may be still further decomposed as knowledge increases. This clear definition was in his eyes much better calculated to advance the progress of chemical knowledge than the vague ideas expressed in the theories of Aristotle and the alchemists. Boyle's views, however, were not admitted by his contemporaries. He also first defined acids and alkalies in reference to their action on vegetable colors, and

showed that what has been dissolved in the one may be precipitated by adding the other. In applying this to analysis, he made a great step, the so-called dry method of analysis having been previously exclusively used. To this day several reactions first described by Boyle are in common use; for example, the detection of ammonia by adding lime to the matter containing it, and observing the fumes that are formed in presence of an acid; also the detection of silver by muriatic acid. He likewise made many observations of affinity. Nicholas Lémery (1645-1715), a famous lecturer at Paris, deserves mention for his efforts in the diffusion of chemical knowledge. As a clear and systematic writer, he was justly celebrated.—Another modification of views regarding the elements, which exerted great influence, was expressed by Becher (died 1682). According to him, all inorganic bodies are composed of earthy ingredients. There are three elementary earths, the fusible, the combustible, and the mercurial, severally principles of fluidity, combustibility, and volatility. These three earths are present in all metals, combined in different proportions. When combined with water they form the salts, and also a universal acid which is the basis of all acids. He regarded the calcination (oxidation) of metals and combustion in general as a process of decomposition depending on the expulsion of the combustible earth by means of fire. A simple body incapable of decomposition could not burn, for every body capable of burning must contain within itself a cause of its combustibility. This doctrine was soon adopted by Stahl, and under the name of the phlogiston theory characterized an epoch in the history of the science. Chemistry now first stands out on an equality with the other natural sciences. Its aim is no longer either the making of gold or the curing of disease. A desire to acquire a knowledge of the composition of bodies, to explain the phenomena which accompany their formation and decomposition, and to ascertain what relation exists between their properties and their composition, became now the motive of chemists. Modern chemistry, properly so called, now commenced. The first special problem which attracted attention was the explanation of the phenomena of combustion and oxidation. The analogy between these processes had been long observed and often considered. The ancients regarded combustion as dependent upon the separation of fire, apparently believing the latter to be something material. This view was admitted for a long period. The alchemists expressed a similar idea by their figurative sulphur, which was supposed to be expelled when a body burned. For the term sulphur, Becher substituted combustible earth, and defined more clearly the idea that it was separated during combustion. The notion that combustion destroys was undoubted; something was separated, causing the appearance of flame, while the incombustible residue was one of the components of the

compound which had been destroyed. In like manner, when a metal was oxidized, the calx (oxide) was considered to be an educt from the metal. The famous phlogiston theory of Stahl (1660-1734) was a more accurate expression of these views. According to him, all combustible bodies must contain one and the same ingredient, to which they owe their common property, combustibility. This combustible matter he calls phlogiston; its existence, although entirely hypothetical, was regarded by Stahl as being so certain that it was hardly worth while to isolate it, and but few attempts to do so were made by his immediate followers. Later it was thought to be identical with hydrogen. Expressed in the language of the present day, phlogiston may be regarded as the opposite of oxygen. What is now deemed a combination with oxygen was considered by Stahl to be the result of a separation of phlogiston. During combustion phlogiston is expelled, while the other constituents of the compound remain. Charcoal, which leaves little or no residue when burned, was thought to be nearly pure phlogiston. In general, the combustibility of bodies was supposed to depend on the proportion of phlogiston which they contain. On examining the residues left by different substances after their phlogiston had been expelled, it was thought that a knowledge of their original constitution could be obtained. Experience was thus supposed to teach that phosphorus is a compound of phosphoric acid and phlogiston; that the metals are composed of calxes and phlogiston. If bodies from which the phlogiston has been expelled are heated with others rich in phlogiston, the latter give back phlogiston to the former and the original compound is produced. Thus, when a metal calx is heated with charcoal, the original metal is formed. Besides combustibility, Stahl referred color, solubility in acids, and other chemical properties of bodies, to the amount of phlogiston contained in them. For example, he showed that metals which had been deprived of their phlogiston could no longer unite with sulphur. These ideas were greatly extended by his followers. Stahl's observations of new facts and upon affinity were numerous and valuable. Although unable to free himself entirely from the vague speculations of the alchemists, he adopted in general the idea of elements suggested by Boyle, regarding as such all peculiar constituents of matter which by uniting with each other and with phlogiston form compound bodies. At this period investigations to ascertain what substances should be regarded as elementary commenced. Thus the metal calxes (oxides) were considered to be elements, as were sulphuric and phosphoric acids, &c. Boerhaave (1668-1738) and Homberg (1652-1715) were especially diffusers of chemical knowledge. The *Elementa Chemia* of the former, published in 1724, exerted an influence which has probably never been surpassed. His experiments made in order to disprove certain statements of the

alchemists deserve mention. It had been stated that mercury could be converted into an infusible metal when subjected to the continued action of heat. Boerhaave maintained a quantity of mercury at a moderate heat during 15 years without effecting such transformation. Another portion of mercury, being strongly heated in a closed vessel for six months, remained unaltered. It had also been stated by the alchemists that mercury could be converted by repeated distillation into a more volatile body. Boerhaave distilled pure mercury 500 times without perceiving any alteration in its boiling point. From these experiments he inferred that the given statements were erroneous. Geoffroy (1672-1731) published systematic tables of affinity, which exerted a long-continued influence on the science. Marggraf of Berlin (1709-'82) was distinguished as an analyst and technical chemist; he first called attention to the existence of sugar in the beet root and other plants indigenous to Europe. Macquer of Paris (1718-'84) pointed out the existence of arsenic acid, and made other new observations. His idea of four material elements, earth, air, fire, and water, illustrates the tendency of the period gradually to do away with the vague expressions of the alchemists. Equally characteristic is the fact that although Macquer had himself often used the quantitative method of analysis in investigating mineral waters and metallurgical matters, and considered it very necessary in such connection, he utterly neglected it when studying theoretical questions, and viewed with indifference the antiphlogistic theory, founded on such unimportant data, as he thought, as mere differences of weight. He regarded phlogiston as identical with light, and capable of passing through transparent media, thus explaining the reduction of peroxide of mercury by heat, which had been observed in glass vessels. The English chemists of this period were, meanwhile, observing facts which afterward constituted the most effective weapons of the opponents of the phlogiston theory. The discoveries of Black, Cavendish, and Priestley led naturally to its overthrow. The investigation of the alkalies by Black of Edinburgh (1728 '99) was of great importance. It had previously been supposed that when limestone was burned it united with fire and thus obtained caustic properties. From caustic lime this fire could be transferred to the mild (carbonated) alkalies, rendering them caustic, while the lime having given up its fire became again mild. Black disproved this view by showing that the mild alkalies are compound bodies and become caustic, not by combining with fire, but from losing one of their constituents, a gas, which he called fixed air. He proved that limestone loses weight when burned to caustic lime, from which he inferred that the latter is contained in the former. He observed that the mild alkalies effervesce with acids, a gas similar to that given off by burning limestone being evolved. This gas (carbonic acid)

he regarded as the second constituent of the limestone or other mild alkali, drawing the conclusion that the true caustic alkalies must be simple bodies which become mild only by uniting with fixed air. This view, after some opposition, was soon universally received by chemists. Black also distinguished more clearly than had been done before the difference between lime and magnesia. The discovery of latent heat is also due to him. The celebrated physicist Cavendish (1731-1810) added greatly to chemical knowledge by his accurate experiments upon gases. He investigated hydrogen, and was led to consider it identical with phlogiston. According to him, when dilute sulphuric acid is added to metallic iron or zinc, inflammable air or phlogiston separates unchanged from its combination with the calx, while the latter unites with the acid. If concentrated sulphuric acid be used, the phlogiston is no longer set free as inflammable air, but combines with a portion of the acid, forming another gas which is not inflammable (sulphurous acid, already called phlogisticated sulphuric acid by Stahl). Cavendish's view of the identity of hydrogen and phlogiston was soon admitted by the supporters of the phlogiston theory, especially after it was found that calxes could be transformed to metals when heated in an atmosphere of hydrogen. The original idea of phlogiston was thus somewhat modified. With Stahl a dephlogisticated substance meant one which had been oxidized: thus, sulphuric acid was dephlogisticated sulphur; while at the end of the phlogiston period it meant as well a body which had been deprived of hydrogen: thus Cavendish and Priestley call oxygen dephlogisticated water. Cavendish also investigated carbonic acid and the quantitative composition of atmospheric air. The latter he proved to contain oxygen and nitrogen in the same proportions at all seasons of the year and in different localities. He investigated the changes caused in air by combustion, showing that carbonic acid is formed only when the combustible is of animal or vegetable origin. Synthetically, he ascertained the composition of nitric acid by passing a series of electric sparks through air; also that of water. This last was specially important, having been used with great effect by the opponents of the phlogiston theory. Although few men contributed more to the overthrow of this theory than Cavendish himself, yet he to the last remained true to its tenets, having explained all his discoveries in accordance with them. His reputation has suffered greatly from this, for the chemists who subsequently correctly explained his observations have shared with him the merit of them. One of the last and firmest defenders of phlogiston was Priestley (1733-1804). Having invented suitable apparatus, similar to the pneumatic trough of the present day, he was enabled to collect and observe the properties of all the more important gases, the number of his discoveries in this field being truly remarkable.

Most important among them was the preparation of oxygen from the red oxide of mercury by means of heat, although Priestley himself failed to appreciate the true value of his discovery. He, however, observed that this gas is given off by growing plants, whence he concluded that the latter thus replace the oxygen which has been removed from the air by combustion, &c., and that the two processes are in equilibrium with each other, the constant composition of air being thus maintained. Of equal importance for the development of the present system, though exerted in a different direction, were the labors of the Swedish chemists Bergman and Scheele. The method of analysis by the wet way introduced by Boyle had been but little followed till Bergman (1735-'84), carrying out the idea, established a complete series of reagents, and taught their use. He thus laid the foundation of the present system of inorganic analysis. He saw the advantage to be gained by causing each ingredient of a compound to unite with some other body with which it formed a combination of known constitution, capable of easy separation, rather than seek to isolate and determine it as such. Bergman analyzed a great number of substances, and investigated the composition of many salts. But although possessing such correct views, he was an indifferent analyst, not equal even to some of his contemporaries. His reputation was so great, however, that many years elapsed before any correction of his results was allowed, though many of them have been since proved erroneous. He made numerous important discoveries; correctly explained the difference between cast iron, wrought iron, and steel, as well as the composition of many salts previously misunderstood. His most important work was upon chemical attraction (affinity). Some idea of its magnitude may be given by stating the fact that he drew up tables of the affinity of 50 different substances for each other, arranging them in two series according to their behavior when treated respectively in the dry or wet way. An enumeration of the original observations and discoveries of Scheele (1742-'86) would fill a volume. His investigations in organic chemistry alone are sufficient to prove him one of the best analysts that ever lived. He separated all the more common organic acids from plants, and knew how to distinguish them when mixed with each other, having devised processes for their separation. Several acids of the animal economy did not escape him. He detected the presence of glycerine in the fats, separating it by means of oxide of lead, and prepared prussic acid from prussian blue. He also discovered molybdic and tungstic acids. Most fruitful was his research on the minerals of manganese, which, when the means at his disposal are considered, must be regarded as standing without parallel in the annals of chemistry. He discovered, first, the presence of a new metal (manganese); second, on add-

ing muriatic acid to the black oxide of manganese, on which he was experimenting, a peculiar gas (chlorine) was evolved, the properties of which he accurately described. It is worthy of remark that he named it dephlogisticated muriatic acid, and at that time phlogiston was synonymous with hydrogen, showing that he regarded it in the same light as chemists do now. Thirdly, the ore of manganese on which he operated happened to contain a quantity of baryta, which he separated, and, having studied its properties, recognized as a new and peculiar substance. In solutions of its salts he found a test for sulphuric acid, which has since been universally used. Equally able was his investigation of fluor spar; he found it to be a compound of lime with a peculiar acid, which destroyed his vessels so rapidly that he was unable to collect it. He investigated atmospheric air in its relations to combustion, finding that it contains two different gases, one of which, "empyrean air" (oxygen), is capable of supporting combustion and respiration, while the other, "vitiated air" (nitrogen), cannot maintain these processes. He proved that the metals, when burned to calxes, absorb empyrean air, while the calxes give it off when reduced to metals. He prepared oxygen at about the same time as Priestley, entirely independently, as admitted by Priestley himself, having obtained it from peroxide of manganese and from saltpetre as well as from the oxides of silver and mercury. The fact that the phlogiston theory had become inadequate to explain many points already known in chemistry, is more fully exhibited by Scheele than by any other chemist. He ostensibly believed in this theory, yet observation had taught him that oxygen is absorbed by metals during calcination and by combustibles when burning. To explain this, he conceived that oxygen is a compound of water with a certain light saline matter, in which compound but little phlogiston is contained. During combustion the phlogiston of the combustible unites with the saline matter of the oxygen, producing light and heat, while the residual product is a compound of the matter which had originally been combined with phlogiston in the combustible, with the water of the oxygen. This theory, it will be seen, differs most essentially from that of Stahl, who saw in combustion nothing but a separation of phlogiston, while Scheele regarded it as a mutual decomposition of the combustible and the substance supporting combustion, new compounds being produced.—These views clearly show the transition state of chemistry at that period. In general, the ideas which the several chemists attached to phlogiston toward the end of the 18th century were far from exhibiting the accordance which had previously existed. The main feature of the phlogiston theory consisted in regarding combustion as depending upon decomposition, while chemists have since learned that it arises from the formation of compounds. It however explained the analogies and mutual rela-

tions of numberless phenomena which had previously been known as mere isolated facts. It was the most rational theory of combustion, and of many analogous processes now referred to oxidation and reduction, which had been proposed. In a comparatively short time it led to a multitude of discoveries. By regarding bodies as composed of undecomposable elements, it established the view which has ever since been admitted. Indeed, the definition of chemistry given by Stahl, the art of decomposing compound bodies and of reproducing them, is entirely in accordance with the spirit of the present day. Far from lamenting the phlogiston theory as an error, it should be regarded as a necessary basis for the views of the present epoch. In order to obtain a correct knowledge of substances, it was essential that their properties and relations to one another should be first investigated qualitatively. In the accomplishment of this work lies the merit of the phlogiston period. The quantitative method of investigation which followed, and which is characteristic of the present epoch, was but a natural succession. In no instance, however, in the history of chemistry has the transition from one system to another been so abrupt as from phlogiston to anti-phlogiston. Rarely has the introduction of an entirely new doctrine been so completely dependent upon one individual as was that of the present system upon Lavoisier (1743-'94). He first caused the importance of the quantitative method of research to be recognized, having by its aid perceived that the increase of weight acquired by a given weight of metal, when oxidized, must disprove the whole theory of phlogiston. The mere fact of this increase of weight had long been known; even Stahl was familiar with it. He regarded it, however, as entirely unessential and dependent on accidental circumstances. His followers were of the same opinion. One or two chemists had indeed called attention to the fact that this increase of weight was caused by an absorption of gas, but they had not themselves perceived the true importance of their observation, and their explanations had remained unnoticed. When at length the more careful investigation of Lavoisier had clearly proved the fact that the oxidation of metals is accompanied by increase of weight, the most absurd propositions were resorted to by the supporters of phlogiston. Among them it is only necessary to instance the hypothesis that phlogiston possessed absolute levity, being a substance endowed with a peculiar repulsive force, tending to remove it from the earth instead of gravitating toward it like other substances; whence a body losing phlogiston must become heavier. Lavoisier not only exposed the error of supposing that the heavier metallic oxide could be an ingredient of a metal possessing less weight, but also framed a new theory in explanation of the facts, viz.: that in calcination, as in combustion generally, one of the ingredients of the atmosphere unites with the combustible in such

proportion that the products of combustion weigh exactly as much as the sum of the weight of the substance consumed plus the weight of the matter absorbed from the air. Still more important was his proof that wherever an increase of weight occurs combination must have taken place; that the weight of the product of such combination is equal to the sum of the weights of its ingredients, while diminution of weight is invariably owing to separation of ponderable matter. As an investigator Lavoisier stands preëminent. His precision of observation, ingenuity in devising apparatus, and his patience, are only equalled by the clearness of his conclusions and his masterly description of facts. His original experiment, showing that the increase of weight which a metal acquires when calcined is caused by its combination with a gas, deserves to be mentioned. A known quantity of metallic tin having been placed in a retort, the latter was sealed up and the whole weighed. Heat was then applied until the tin, having melted, was converted to a greater or less extent into a calx. On again observing the weight of the apparatus, it was found to have remained unchanged. But on opening the retort, air rushed in, and on again weighing an increase of weight was found to have occurred. This excess of weight showed how much air had entered the retort to replace what had been absorbed, and it was found that the weight of the tin had been increased by the same quantity. After the discovery of oxygen by Priestley, Lavoisier refined this experiment by using mercury in place of tin. Continuing his observations on oxygen, he found that carbonic acid is a compound of it and carbon, and explained the combustion of organic substances. He also studied the composition of sulphuric and other acids, seeking to multiply proof of his view that oxygen is the universal acidifying principle. Cavendish's discovery that hydrogen when burned forms water, afforded Lavoisier a clue for the explanation of the solution of metals in acids, which had previously been the weak point of his theory. He recognized at once that decomposition of water must take place, its hydrogen being set free, while the oxygen unites with the metal. He also prepared water synthetically, and analyzed it by passing its vapor over red-hot iron, with which the oxygen united while hydrogen was set free, thus fixing its composition beyond the possibility of doubt. Lavoisier distinguished among the chemical elements those which ought to be regarded as simple, their further decomposition being improbable, as light, heat, oxygen, hydrogen, and nitrogen. Others he considered not so much simple as undecomposed, their ingredients not yet being known. In this class he placed the alkalies, earths, and metals. The radicals of the acids he supposed to be simple; of these, sulphur, carbon, and phosphorus were known, while the radicals of boracic, muriatic, and hydrofluoric acids

were merely hypothetical. He also sought to analyze organic substances by converting them into carbonic acid and water, thus originating the method now used, the means of executing which have alone been changed. The views of Lavoisier were greatly advanced through the coöperation of his contemporaries and countrymen, Guyton de Morveau (1737-1816), Fourcroy (1755-1809), and Berthollet (1748-1822). With Guyton de Morveau the idea of a rational nomenclature originated, and by his efforts the system now used was produced. The naming of chemical substances had previously been governed by no rules whatsoever, the name given to a new compound depending entirely on the taste and humor of its discoverer. With few exceptions no name offered any clue to the chemical properties of the substance. Guyton de Morveau first attempted in 1782 to express an idea of the composition of a substance by its name. This met with violent opposition from all sides. Lavoisier, however, had keenly felt the want of a systematic nomenclature; he therefore accepted the proposition to combine his new theory with the new nomenclature. Associating himself with Guyton de Morveau, Berthollet, and Fourcroy, a system was produced so nearly perfect that it only recently experienced a change in spite of the immense development which the science has since undergone, and the discovery of many substances, the existence of which could not have been foreseen at the time of its formation. Berthollet was the first chemist of importance who adopted the views of Lavoisier. He afforded them most important aid by many admirable experiments and acute investigations. Although he manifested his own independence by refusing to admit that oxygen is the only acidifying principle, two acids, hydrosulphuric and hydrocyanic, which contain none, being already known, he was nevertheless led into error by Lavoisier's assumption that muriatic acid was composed of an unknown radical united with oxygen; conceiving that chlorine was composed of the same radical combined with more oxygen, while the acid which he discovered in chlorate of potash was supposed to contain this radical combined with a still greater quantity of oxygen. This error was not corrected until long afterward. Of the works of Berthollet, that upon affinity was of most importance for theoretical chemistry. While he admitted that all substances have really different degrees of affinity for each other, he sought to prove that what was commonly called affinity depended in great measure upon the relative quantity of the bodies acting on each other (force of mass); moreover, that the phenomena of decomposition attending such action depend essentially upon the physical properties of the compounds which are formed. Since affinity can act only through direct contact of the most minute particles of matter, a body may be removed from the field of chemical action

either by its insolubility (preponderating cohesion), or by its escape in the gaseous form (elasticity). According to him, there is no reason why two bodies cannot unite in all possible proportions to form chemical compounds, if their cohesion and elasticity, as well as those of the resulting compounds, are equal. The very thorough manner in which Berthollet explained all existing facts by means of this theory, combined with the strictness of his conclusions, caused it to receive at once universal attention. A few of his views have been indeed disproved, but as a whole it has since exerted a highly important influence on chemistry. The intimate dependence of the phenomena of decomposition upon the physical character of the resulting compounds, and the great influence which mass exerts in most reactions, have been universally recognized. Berthollet made several important researches. He determined the composition of ammonia, discovered fulminating mercury, and contributed much to the existing knowledge of prussic acid, chlorine, and hydrosulphuric acid. The technical applications of chemistry which he brought about were numerous and exceedingly important; preëminent among them is the use of chlorine in bleaching.—The political condition of France toward the close of the 18th century exerted a most decided influence upon the progress and direction of chemistry, especially in its application to the arts, and its diffusion as a branch of popular knowledge. Previous to this time, technical chemistry was nothing but a collection of empirical facts, uncared for by scientific men, and all improvements in the arts depending upon chemical processes were the result of accident. But when France, a country accustomed to purchase from other nations her most important munitions of war, was cut off from outside communication, and compelled to defend herself against all Europe, scientific men, and especially chemists, were called upon to point out the means of producing the materials of war on which the very existence of the nation depended. They were asked to bring forth in a day arts which in other countries had resulted from the experience of years. There was no time now for a repetition of the groping empiricism by means of which these arts had been created. Science has rarely answered practical questions so quickly and clearly. Not only were the requisite munitions soon prepared, but many arts were developed to an extent previously unknown. A knowledge of the sciences thus came to be considered of great importance for the welfare of the nation. As soon as law and order had been in a measure restored, new institutions for instruction were formed, to replace those which had been destroyed, in which the study of mathematics and of the physical sciences was made preëminent. This purely material direction has been thoroughly carried out in several of the most renowned schools of France. The influence which it has exerted in diffusing chemical knowledge is

incalculable. Since the latter has become a matter of popular education, the methods of teaching it have been made subjects of special study and have been vastly improved. The immense influence which chemistry now everywhere exerts upon arts and manufactures, and which is one of the characteristics, not only of the science itself, but of the civilization of the 19th century, may be traced directly back to the labors of Berthollet, Guyton, and their associates. In connection with these, Fourcroy deserves mention. He devised the plan of the system of instruction introduced into France by Napoleon, and did good service as a lecturer and writer.—Attention having been specially directed to quantitative analysis by Lavoisier and Bergman, many chemists now occupied themselves with it. Of these, Klaproth (1743–1817) in Germany, Vauquelin (1763–1829) in France, and Proust (died 1826) in Spain, exerted the most influence. Klaproth was the first German chemist who admitted the correctness of Lavoisier's views. He did much to diffuse them among his countrymen, in spite of the national feeling brought to bear against the "French system." But his chief merit is as an analyst. He first introduced the custom of publishing the results of quantitative analyses, as found directly by experiment. Any loss or excess had previously been distributed among the several ingredients, and such corrected values alone published, leaving no clue from which other chemists might judge of the accuracy of the statement. This led to numerous errors, many false notions of the composition of bodies having long been held on the authority of a single analyst. The utility of Klaproth's system of publishing details has been most clearly proved by the fact that many of his own analyses have coincided with corrections which it has since been found necessary to apply to the inferences he had himself drawn from them. Klaproth devised the more common methods of decomposing insoluble minerals, which are still used. He pointed out the influence which the gradual destruction of the utensils in which analyses are made exerts upon the results obtained, and called attention to the necessity of applying a correction on account of it. Many of the methods now used for separating bodies from each other have come down from him. He discovered the oxides of uranium, zirconium, cerium, and titanium, and made many other important observations. Vauquelin performed a great amount of analytical labor, especially in regard to minerals. With Klaproth he had widely extended the field of analysis. But although they were agreed that most bodies have a constant or nearly constant composition, they were silent when Berthollet advanced an opinion that the reverse is often the case. Berthollet admitted but few compounds of constant composition in one proportion. In most bodies he thought the constituents capable of uniting in any proportion between two limits. Thus, iron could unite

with oxygen in any proportion between protoxide and peroxide. This view did much mischief. Every false analysis supported itself, while it seemingly supported the theory, upon it, by admitting that the combining proportions of the ingredients were variable. Proust deservedly won great reputation by proving that these supposed intermediate compounds do not exist in so many varying proportions. He demonstrated that when two substances unite in several proportions, the compounds formed are but few and are separated from each other by intervals, never gradually shading into each other. He explained correctly the composition of red lead, of magnetic oxide of iron, &c. He pointed out the errors committed by previous investigators of the subject, and the necessity of not confounding chemical compounds with mechanical mixtures. His views were soon received as correct by chemists, in spite of the opposition of Berthollet. He also carefully studied several metals and hydrates of metallic oxides, distinguished grape from cane sugar, &c. Proust and his predecessors, in determining the composition of bodies, sought only to ascertain how much of each ingredient was contained in a constant weight, usually 100 parts of the compound, thus referring the weight of the ingredient to that of the compound. The science had thus been greatly advanced, but still more important discoveries were made when chemists began to consider the relations which the weights of the several ingredients of a body bear to each other, and to investigate how much of one substance is required to replace another in a compound. The idea of chemical equivalents thus arose, and it was soon recognized that chemical combinations take place not only in constant but also in simple relations of weight. Wenzel in 1777, and Richter in 1792, in Germany, were the first who endeavored to call attention to this subject. The former explained the fact that when two neutral salts mutually decompose each other, the resulting mixture is still neutral, by admitting that a quantity of either base sufficient to neutralize one acid could also neutralize the other acid. He moreover showed that the relative weight of two bases which neutralize the same quantity of acid remains constant, no matter what acid may be used. Arguing from Wenzel's law, Richter showed that, in accordance with it, the composition of all the neutral salts of one acid and of any one salt of any other acid having been ascertained by analysis, the composition of any other salt of this acid could be calculated. He also showed that numbers could be affixed to the acids and bases which would express the relation of weight in which they combine with each other to form neutral salts, and even constructed such tables of equivalents. The views of both these chemists were neglected until the publication of the atomic theory of Dalton (1766–1844) recalled the attention of chemists to them, when they exerted no inconsiderable influence in establishing Dalton's doctrine. This last was much more extended

than the views of either of the chemists just mentioned. Having observed that when a determined quantity of any substance united with different quantities of a second substance, the quantities of the latter always bore a simple relation of weight to each other, Dalton was led to the formation of his atomic theory. He regarded the elements as composed of homogeneous atoms, the weights of which are different for each different element. An atom of one element can unite with one or more atoms of another element, the weight of the atom of the compound formed being the sum of the weights of its component atoms. He determined the relative weights of these atoms for the different elements, as expressed by the relative weights in which they unite to form compounds. Although the term atom used by Dalton expresses nothing more in a chemical sense than Richter's word equivalent, there was a tangibility in the former which caused the view to be more readily accepted. Moreover, Dalton's discovery of the law of multiple proportions, and that the atomic weight of compounds is the sum of the atomic weights of their ingredients, made the subject so complete that it could no longer be neglected. It was at once admitted into the science, and gave rise to the views concerning the quantitative composition of bodies which now exist. Besides the atomic theory, chemistry owes much to Dalton for his investigations of the expansion of gases, evaporation, and the relations of mixed gases, elasticity of steam, &c. Wollaston (1766-1828) did much to diffuse and extend Dalton's theory. His "scale of chemical equivalents" especially aided in this result. As an exact analyst also, he was deservedly celebrated. Most important in connection with Dalton's doctrine was the discovery by Gay-Lussac (1778-1850) of the law of combining volumes, in accordance with which gases unite with each other. In conjunction with Humboldt he first observed that one volume of oxygen unites with two volumes of hydrogen to form water. Extending his researches, he found that other gases unite in equally simple proportions, and that the volume of the resulting compound, if gaseous, bears a simple relation to the sum of the volumes of its ingredients. This proved conclusively that chemical compounds are formed only in a few fixed and definite proportions, according as it did with Proust's researches upon the composition of solid bodies. It was soon perceived that, the specific gravity of a gas being known, its atomic weight might be readily calculated, whence the determination of the density of gases became at once important. Of the many valuable investigations conducted by Gay-Lussac, those upon the expansion of gases by heat, density of vapors, for the determination of which he devised an apparatus, expansion of liquids, evaporation, sulphur acids, chlorine compounds, and iodine may be mentioned. His researches in organic chemistry were also very important. He first pursued the method of research which has since exerted

so great an influence upon the development of chemistry. The investigation of the cyanogen compounds and isolation of cyanogen, a compound of nitrogen and carbon, yet closely resembling in its properties the element chlorine, gave rise to the idea of organic radicals, and formed the starting point to which the present method of regarding organic bodies directly refers. He first devised an apparatus for the ultimate analysis of organic substances which produced useful results, infinitely superior to any previously obtained, and furnished a basis for improvement. He also introduced the system of determining the specific gravity of the vapors of substances to control analyses. Many of his applications of chemistry to the arts were of great importance; among them are the methods of assaying silver by the wet way, of alkalimetry, of chlorimetry, of assaying gunpowder, &c., still in use.—Simultaneously with the investigations upon the atomic weights and atomic volumes, which occupied chemists after the discoveries of Dalton and Gay-Lussac, another subject of great importance in its bearings upon the doctrine of affinity, and which produced most striking results when applied to the study of certain individual substances, was brought forward. This was the investigation of the connection between galvanism and the phenomena of affinity. When Berzelius and Hisinger began to study this subject in 1803, it had already been noticed that water could be decomposed by the galvanic current. They verified this experiment, and moreover showed that salts could be decomposed by the same means; while an electrical opposition between acids and bases was indicated by the fact that under all circumstances of decomposition acids were set free at the positive pole, bases at the negative pole, of the voltaic pile. The subject rested somewhat obscure, however, until cleared up by Sir Humphry Davy (1778-1829), most of whose labors were devoted to electro-chemistry. He first showed by a most admirable research that pure water when decomposed by galvanism produces only hydrogen and oxygen; that the acids (nitric and muriatic) and bases (ammonia and soda) obtained by previous experimenters had been produced either from air contained in the water or from the action of the galvanic current upon the vessels used in the operation. Studying this last action more carefully, he eventually succeeded in separating metals from the fixed alkalies, potash and soda, and proved these last to be metallic oxides. Small as were the quantities of metal thus obtained, he described their properties with surprising accuracy. He afterward proved that the alkaline earths are similarly constituted, and inferred from analogy that the earths are of the same nature; the correctness of which opinion has since been fully proved. Having studied the chlorine compounds, he was led to regard chlorine as an element, and disproved Berthollet's view of its composition, which had hith-

erto been universally received. This gave rise to the first modification of any importance which Lavoisier's system suffered. Oxygen could no longer be regarded as the sole acidifying principle. The idea of hydrogen acids was introduced, and substances which contain no oxygen admitted to be salts. Of the many other researches conducted by Davy, that upon flame and combustion, which led to the discovery of the safety lamp, was especially valuable. His electrical theory has been since modified, but, like most of his work, has been of immense importance to the science. The value of his discovery of the metals of the alkalis was not limited to a theoretical bearing alone. From the enormous affinity for oxygen which they possess, a means was furnished far stronger than any previously known of decomposing other bodies. They did not obtain their full importance as reagents, however, until a process of manufacture was devised by Gay-Lussac and Thénard, by which they were obtained in comparatively large quantities. By them the chemists last mentioned were led at once to the discovery of boron, of hydrofluoric acid, of fluoride of boron, &c. Since then they have been the means of many discoveries. As an investigator and diffuser of chemical knowledge, as well as by his systematic classifications, Thénard (1777-1857) was of great service to the science. His division of the metals into groups, according to their behavior at different temperatures in presence of water, has been quite generally followed. Among his important discoveries may be mentioned that of the peroxide and of the persulphide of hydrogen.—No one chemist since Lavoisier has exerted an influence comparable with that of Berzelius (1779-1848). In him were united all the different impulses which have advanced the science since the beginning of the present epoch. The fruit of his labors is scattered throughout the entire domain of the science. Hardly a substance exists to the knowledge of which he has not in some way contributed. A direct descendant of the school of his countryman Bergman, he was especially renowned as an analyst. No chemist has determined by direct experiment the composition of a greater number of substances. No one has exerted a greater influence in extending the field of analytical chemistry. The use of hydrofluoric acid in decomposing minerals, and of chlorine in the analysis of minerals containing metals capable of forming volatile chlorides, originated with him. Of his manifold and always admirable researches may be mentioned those upon the organic acids; upon selenium, which he discovered; upon the alkaline sulphides, in which the theory of sulphur salts, analogous to those of oxygen, was brought forward; upon the fluorine compounds; upon platinum and the metals occurring with it; upon tellurium; upon meteorites, and upon the silicates. He first isolated several substances, as silicon, zircon, tantalum, &c. The remarkable amal-

gam which mercury forms with what is supposed to be ammonium was first obtained by him in conjunction with Hisinger. One of the principal services he rendered was in developing the present theory of the science. Before Dalton's views had become generally known, Berzelius had perceived the importance of Richter's tables of the combining equivalents of acids and alkalis, and had carried out an extended investigation of the composition of salts to ascertain if they were true. The results obtained convinced him at once of the correctness of Dalton's generalization, which soon afterward came to his knowledge. He continued his researches, and worked out most fully the details of the subject. Among other things, he thus discovered the simple relation which the oxygen of the acid bears to the oxygen of the base in neutral salts. He also endeavored to ascertain with the greatest possible exactitude the relations of weight in which the different elements unite to form compounds. His acuteness in selecting the materials best suited for his experiments, and the precision with which their quantitative analysis was conducted, have never been surpassed. He did not limit himself to prove these equivalent weights for only a few substances. By far the greater number of the elements were investigated by him, and a large proportion of the equivalent numbers still in use are his. Corrections have been made only by those experimenters who have been able to procure purer materials; as an accurate analyst, Berzelius has never been surpassed. He first demonstrated that organic bodies combine according to the equivalent weights of their ingredients, and introduced the method of analyzing their compounds with inorganic bodies of known equivalent weight as a means of arriving at their equivalent. He maintained most persistently the view that organic substances form combinations analogous to those of inorganic bodies, and that they ought to be explained in accordance with what is known of the latter, having steadfastly opposed the innovations on this doctrine brought forward by other chemists. He made, however, numerous accurate analyses of organic substances, and chemistry owes to him the theories of copulate acids and of organic radicals. The latter, in accordance with which a substance may be composed of two or more elements, and yet be capable of entering into combination with elementary bodies as if it were itself elementary—in a word, play the part of an element—has since exerted a most important influence upon the development of the science. The admirable system of chemical symbols now in use also originated with Berzelius.—Following in the footsteps of Davy, Faraday (1791-1867) was most fortunate in developing the relations of electricity to chemistry. He widely extended the idea suggested by Davy that electricity and chemical affinity are only different expressions of one and the same force. All his experiments tended to support this view. Although most of his re-

searches fall more properly within the province of physics, they are nevertheless of the greatest interest in their chemical bearings. Preëminent in this respect are his works upon the liquefaction of gases, and upon certain compounds of hydrogen and carbon, which last was one of the starting points of the doctrine of isomerism, also upon the compounds of carbon and chlorine, and of ammonia and metallic chlorides. Working like Faraday in the domain of both physics and chemistry, Mitscherlich of Berlin (1794–1863) exerted a great influence on the present condition of the science by his discovery of the law of isomorphism, in accordance with which certain groups of substances exist, any one member of which can be replaced by any other member or set of members in equivalent proportion in its compounds, without changing the crystalline form of the latter to any material extent; and of dimorphism, the power possessed by some substances of crystallizing in two distinct systems not reducible to the same primary form. Following as did these discoveries upon those of Faraday, and that of the French physicists, Dulong and Petit, of the relation between the specific heats and equivalent weights of substances, it tended greatly to call the attention of chemists to the physical relations of bodies. A physico-chemical school has thus been founded, to which several of the leading chemists of the present day belong. The discoveries of Mitscherlich, the details of which he worked out by a series of most laborious researches, were soon brought to bear with advantage upon the classification of the elements, while that of minerals underwent an entire reform.—The theory of compound radicals proposed by Berzelius was again made specially prominent by the publication (in 1832) of a memoir, the joint production of Liebig (1803–'73) and Wöhler (born 1800), upon the benzoyl series. Although Berzelius refused to admit the generalization made by these chemists, and disbelieved in the existence of radicals which like benzoyl contain oxygen, an interest was nevertheless excited, which greatly contributed to the advancement of organic chemistry. The ethyl theory quickly followed, and was adopted by most German and English chemists. These results mark an era in the history of modern chemistry. A throng of pupils immediately gathered about Liebig. No other chemist has ever had control over an amount of talent equal to that of the students who for years crowded his laboratory at Giessen. Through them he exerted an incalculable influence upon the present position of the science, while by his popular writings he did much to diffuse chemical knowledge among the masses. Of the special labors of Liebig may be mentioned his efforts to determine what substances should be regarded as radicals, and to classify all known organic bodies in accordance with them; also his important improvements in the methods of analyzing organic substances. Besides the

investigation of the oil of bitter almonds, which led to the discovery of the existence of benzoyl, his most important researches were made in conjunction with Wöhler; for example, those upon cyanogen compounds and the derivatives of uric acid, by which an immense number of new compounds were discovered. Wöhler has also independently brought to light many new facts, not only in organic but also in inorganic chemistry; for example, his investigation of the compounds of tungsten, the preparation of aluminum and of glucinum, and, in conjunction with H. Deville, of silicon and boron. His method of preparing urea (1828) from inorganic substances was the first and for years the only example of the power of chemists to form organic compounds from their elements. All organic substances previously obtained had been either derived directly from plants or animals, or had been products of the decomposition of substances thus obtained; it had indeed been doubted if any others could ever be prepared.—The labors of the recent French chemists have aided perhaps more than any others in elevating the science to its present position. Although seemingly standing for years in direct opposition to those of the German school, the systems of both have at length been harmoniously combined. Dumas of Paris first discovered, by his research upon the action of chlorine on acetic acid, that the three equivalents of hydrogen contained in the latter can be replaced by as many equivalents of chlorine, while the acetic acid retains most of its characteristic properties. Upon this and similar observations he founded his theory of substitutions, according to which hydrogen and some other ingredients of compounds may be replaced, equivalent for equivalent, by some other element or group of elements, while the properties of the original substance are usually not essentially changed. Few theories have been more bitterly opposed than this, but the facts are now universally admitted. The investigation of the substitutions which can be produced in organic compounds has been for several years a favorite study with chemists. Of late the means of bringing them about, and of reproducing the primary substance by replacing the elements originally removed, have been greatly increased and have led to many fine discoveries. Numberless researches upon organic substances have been conducted by Dumas with very important results. His determinations of the specific gravity of many vapors were of great value, the ingenious apparatus which he devised for this purpose having since been almost universally used. Determinations of the specific gravity of gases made in conjunction with Boussingault were also valuable. Among his most important investigations are those upon the amidogen compounds, ethers, volatile oils, and especially upon wood spirit, made in conjunction with Peligot, by which its resemblance to alcohol was shown—an analogy carried yet further by Balard's discovery of

amyl alcohol, which suggested the idea that the term alcohol must be regarded not merely in a specific but in a generic sense. Similar analogies were soon observed among other organic compounds, and it gradually became evident that very many organic substances could be classified together in homologous series, the composition of each member of which differs from that of the others, either by a certain number of equivalents of carbon and hydrogen, or by some simple multiple of this number; while the chemical properties of the several members of the series are entirely analogous, differing only in degree in direct proportion to the amount of carbon and hydrogen which they contain; whence, the general properties and relations of any one member of a series being known, those of any other of its members may be directly inferred. Remarkable relations between the physical properties of the different members of the same homologous series have also been noticed. Thus, H. Kopp has observed that the point at which the several members of a series boil increases about 19° centigrade for every two equivalents of carbon (old value) plus two of hydrogen which they contain more than the first member of the series. It is admitted by Kopp that the double atom of carbon elevates the boiling point 29° C., while the double atom of hydrogen diminishes it 10° C. The fusing point also of the members of several series presents analogous relations, while Kopp has shown by a number of most important investigations upon atomic or specific volumes (by which terms are understood the relative spaces occupied by the atoms or equivalents of bodies, being the quotients obtained by dividing their equivalent weights by their specific gravities), that the atomic volumes of many homologous compounds differ from each other by a constant quantity, proportional to the number of double atoms of carbon and hydrogen which they contain. The credit of the first clear perception of this wonderful system of homology is due to Gerhardt (1816-'56). No system has done more to advance organic chemistry than this, while no one of his contemporaries has surpassed its gifted and laborious author. Of the chemists who especially devoted themselves to the advancement of the doctrine of substitution, no one can be compared with Laurent (1807-'53). Denouncing compound radicals as purely hypothetical bodies, he endeavored to substitute for them his own theoretical nuclei. In itself this theory has exerted comparatively little influence. In the hands of Laurent, however, it led to the discovery of an immense number of new compounds, the very naming of which required that a special nomenclature should be framed. Few works of recent times have displayed greater originality than his *Méthode de chimie*. The comparative harmony now existing among chemists in their views regarding organic substances was in great measure brought about

by the investigations of the compound ammonias and ammoniums by Wurtz of Paris and Hofmann of London. Kolbe of Marburg and Frankland of Manchester had indeed isolated bodies of the same composition as methyl, ethyl, and other radicals, but their properties were less active than chemists had expected, and their identity with the true radicals was not at once admitted. The question was, however, settled by Hofmann's discovery that one or all of the equivalents of hydrogen in ammonia may be replaced by an equal number of equivalents of one radical possessing basic properties, like ethyl or methyl, or by several such radicals, so that four different radicals may be present in one equivalent of ammonium. Chemists were now forced to admit that the radicals entered into combination precisely as if they were elements, replacing hydrogen equivalent for equivalent. In like manner Gerhardt demonstrated that one or more of the three equivalents of hydrogen in ammonia may be replaced by a compound radical containing oxygen, as benzoyl; thus proving the correctness of the original benzoyl theory, which had suffered so many attacks. The extension given by these researches to the idea attaching to the term ammonia was immense. It became at once generic, including innumerable bodies, all possessing to a greater or less extent the characteristic properties of the original ammonia. Among the most interesting types of organic compounds are those in which two bodies of analogous nature are united together in such a manner that the properties of the compound resemble in kind those of one of its ingredients, the original properties of the latter being modified only in degree. Such compounds are called copulate or conjugate, and may be either acids, bases, or radicals. Many of the copulate acids were studied by Berzelius and his immediate followers, while the conjugate radicals have been especially investigated by Frankland, Löwig of Breslau, and others, among whom Prof. Wolcott Gibbs of New York and Dr. F. A. Genth of Philadelphia deserve special mention. The first investigation of this subject, and one of the finest in the records of chemical science, was that by Bunsen of Heidelberg on kakodyl, a radical composed of two equivalents of methyl united with one of arsenic. Of deep interest is the success which has recently attended attempts to prepare organic compounds by combining others of more simple composition. For a long time urea was the only compound which could be thus prepared, but within the last few years many such have been obtained. In this department, the experiments of Berthelot of Paris are most important. By heating carbonic oxide gas with hydrate of potash in a sealed vessel, he has obtained formiate of potash, from which formic acid may be readily prepared in a free state. By agitating olefiant gas (one of the components of ordinary coal gas) with oil of vitriol, a compound is formed from which, on addition

of water and distillation, alcohol is obtained. By analogous processes, any of the homologues of olefiant gas being substituted for it, the corresponding alcohols may be prepared. More than half a century ago Chevreul by a classical research proved that the fats are composed of various acids united with a peculiar sweet base, called glycerine. Subsequently Berthelot succeeded not only in recombining the fat acids with glycerine, thus forming the original fats, but also caused all the more common mineral and organic acids to unite with glycerine in a manner precisely analogous. Moreover, by substituting for glycerine any of the various species of sugar, similar combinations have been obtained with the fatty and other acids. The indefinite extension which has thus been given to the chemical idea of the fats is a good example of the spirit of generalization now greatly in vogue.—The comparatively immense development which the study of organic compounds has taken of late years has at length brought chemical science to such a position that a new epoch seems not remote. The laws by which the chemical relations of inorganic compounds have hitherto been so well explained, fail in many cases when applied to organic substances. The domain of organic chemistry has become so vast that it will soon assert its right to control the whole science. Several chemists have called attention to the apparent necessity of such reformation. It is acknowledged on all sides that the artificial division of chemistry into organic and inorganic, which has been admitted for some years, is entirely arbitrary, and in many respects unfortunate. That the science shall once more be consolidated is earnestly desired. The doctrine of substitution has already cleared up many matters in inorganic chemistry which had hitherto been inexplicable; while the question of doubling the equivalent weights of several of the elements in order to bring them into accordance with their combining volumes and certain other of their properties is still open. The extraordinary analogy between homologous groups of organic compounds and certain small groups of the elements, as chlorine, bromine, and iodine, has been remarked by several chemists. It has been generalized by Prof. J. P. Cooke of Cambridge, Mass., who has shown that not only isolated triads, but all the elements, may be brought into such homologous series, expressed like those of organic compounds by the general formula $a + nb$. The properties of the members of these series vary in degree in a regular manner according to their position, as in the series of organic bodies. Dumas criticised and in a measure modified Cooke's classification, while acknowledging its merit. The bearing of this subject upon the relations of compound radicals to the so-called elements cannot fail to strike every observer; the difference between them consisting simply in the ability of chemists to separate the former into several ingredients, while the latter are ele-

mentary only because they cannot as yet be thus decomposed.—Without occupying themselves with the investigation of a problem, the transmutation of metals, to the solution of which their science in its present condition offers no clue, chemists have ceased to ridicule the aspirations of the alchemists, although they will always condemn the venal spirit which actuated them. The possibility of effecting such transmutation has of late, however, been more strongly suggested by the discovery of several remarkable examples of allotropism, a term employed to signify that the same body may exist under two or more different conditions, possessing distinct physical and chemical properties. The fact that bodies so entirely unlike in their properties as the diamond, graphite, and charcoal are, chemically speaking, identical, standing as it did for a long time an almost isolated example, excited comparatively little attention. Nor was much notice taken of the different states of sulphur, and of other bodies the allotropism of which was less clearly apparent. But a deep interest was awakened by the discovery of ozone (allotropic oxygen) by Schönbein of Basel, and especially of red phosphorus by Schrötter of Vienna, bodies as unlike ordinary oxygen and phosphorus as can be conceived in every respect but their combining equivalents and reconvertibility into each other. The observation that the elements boron and silicon are, like carbon, susceptible of three modifications, strengthened this feeling. These discoveries recalled attention to the fact that several of the metallic elements have identical equivalent weights, as cobalt and nickel, platinum and iridium, &c.; the question naturally arising whether they may not be allotropic modifications of one and the same substance, especially as such modifications of several substances preserve their peculiarities even when combined in similar quantities with other bodies; for example, the compounds of the red and green varieties of the sesquioxide of chromium. Even the idea attached to the term element has been somewhat modified. At one time it was regarded as expressing not only a certain relative weight of a simple substance, but this substance was supposed to possess constant properties, which were as indestructible as the element itself. Instead of this view, which is at present untenable, the old idea of essence has been in a measure restored.—It would be of course impossible to enumerate here all the valuable labors which have recently been performed by chemists. Those of H. Rose (1795–1864) in developing inorganic analysis; of Regnault, Bunsen, Kopp, and Magnus (1802–'70) in investigating the physical laws connected with chemistry, and of the first two of these chemists in perfecting the processes of gas analysis; of Rammelsberg, Pasteur, Pelouze, Redtenbacher, Malaguti, Williamson, Heintz, Rochleder, Städelé, Strecker, Cahours, Anderson, Kolbe,

Draper, Wurtz, Kekulé, Fresenius, and a host of others, in addition to those who have previously been alluded to, in the field of organic chemistry, deserve special mention. The discovery of the anhydrous organic acids by Gerhardt may here be noticed, as well as H. Deville's process for preparing aluminum and sodium on the large scale, which promises to exert an influence in advancing chemical knowledge equal to that which resulted from the manufacture of potassium and sodium by Gay-Lussac and Thénard. —There is in modern times a general tendency to use the volumetric method of analysis, to employ the blowpipe for quantitative as well as qualitative analysis, and to apply the spectroscope to the detection of rare substances. The nomenclature of chemistry has undergone a remarkable change during the past few years. Old and familiar names have been dropped, and others more in accordance with the modern notions of the true composition of bodies have been substituted. The doctrines at first timidly advanced by a few chemists have gradually been accepted by a majority of scientific writers, and the whole language of the subject is now in a transition state. The equivalent value or combining capacity of an element is now measured by the number of atoms of hydrogen or other monatomic or univalent element with which the element in question can combine. Chlorine, which unites with one atom of hydrogen, is monatomic, monadic, or univalent. Oxygen, which combines with two atoms of hydrogen, is diatomic, dyadic, or bivalent. Nitrogen, which combines with three atoms of hydrogen, is triatomic, triadic, or trivalent. Carbon, which combines with four atoms of hydrogen, is tetratomic, tetradic, or quadrivalent. The elements are divided into two classes, one of odd, the other of even equivalence, the former distinguished as perisads, the latter as artiads; *e. g.*:

Perisads...N, P, As, Sb, Au.

Artiads...O, S, Se, Te, Ba, Ca, Mg, Sn, Mo, W, &c.

The nomenclature of compounds has been adapted to the new order of things, and instead of saying carbonic acid, the compound is now called carbon dioxide or carbonic anhydride. In a work of this character it is preferable to retain the names of substances by which they have long been known, but the modern appellations will always be given. —The details of chemical science are treated in the articles AFFINITY, ATOMIC THEORY, ELEMENT, EQUIVALENT, ISOMERISM, NOMENCLATURE, SYMBOL, &c., and under the titles of the different animal, vegetable, and mineral substances.

CHEMNITZ, a city of Saxony, in the circle of Zwickau, at the foot of a northern offshoot of the Erzgebirge, on the river Chemnitz, 38 m. S. W. of Dresden, and 43 m. S. E. of Leipsic; pop. in 1871, 68,229. It is the most important manufacturing town in Saxony. In 1871 there were in the town 84 factories of woollen stuffs, 63 factories for stockings and mitts, and 25 for

cotton. There were also 19 iron foundries and 38 establishments for the manufacture of machines which are especially exported to Russia. Of the hosiery, gloves, embroideries, laces, and trimmings manufactured here, large quantities are shipped to America, Africa, China, and Japan. The exports to the United States in 1871 amounted to \$4,500,000; of which about \$2,440,000 were cotton hosiery, \$690,000 cotton and woollen gloves, \$1,025,000 embroideries, laces, and dress trimmings. It is connected by railway with Dresden and Leipsic. The first church was built here by the emperor Otho I. in 938. The town became a free imperial city under Rudolph of Hapsburg, and remained so during four centuries. The reformation was introduced by Henry the Pious in 1539. The thirty years' war ruined the town, but industry revived toward the end of the 17th century, when Chemnitz began to supply the German markets with cotton goods. In 1765 hosiery began to be made; in 1770 the first cloth manufactory was established; in 1775 the English quilt weaving was established here; the English hand loom was introduced in 1790; the Arkwright system of cotton manufacture in 1799. The continental blockade became a source of prosperity for Chemnitz, but subsequently, under the free trade system upheld by Saxony, while the surrounding countries maintained a protective tariff, the manufacturing interests of the town received a great blow, from which it only began slowly to revive in 1834, Saxony having joined the Zollverein. The growing trade with the United States gave an additional impetus to its industrial prosperity. The cotton goods, especially hosiery, compete successfully with those of England in excellence and cheapness, one factory, the largest in Saxony, having 18,600 spindles. The town is well built, containing some fine edifices, as St. James's church, with a lofty steeple and remarkable bell, the town house, and the cloth hall. There are five Protestant churches, and one Roman Catholic church; a Lutherangymnasium, *Realschule*, technical school, and commercial school, attended by many pupils from abroad; a chamber of commerce and industry, United States consulate, and several banks. In 1872 there were published here two daily newspapers and three other periodicals.

CHEMNITZ. I. Martin (CHEMNITIUS), a German Protestant reformer, born at Treuenbrietzen, Nov. 9, 1522, died in Brunswick, April 8, 1586. He studied at Magdeburg and Frankfort-on-the-Oder, and went in 1544 to Wrietzen-on-the-Oder, where he saved from his earnings in teaching enough to maintain him for a year at the university. The year 1546 he spent at Wittenberg, under the instructions of Melancthon, by whose advice he gave his attention to mathematics and astronomy. The following year he went to Königsberg, and obtained a situation as rector of the cathedral school. His knowledge of astronomy attracted the atten-

tion of Duke Albert, who made him his librarian. Here he became interested in theology, and finally in 1553 obtained leave to return to Wittenberg. He now devoted himself entirely to the study of the reformed doctrines, and soon became an able expounder of the Protestant faith. From the lectures he delivered while at Wittenberg on Melancthon's *Loci Communes* originated his own celebrated theological work, *Loci Theologici*. In 1554 he accepted the pastoral charge of the church at Brunswick. Here he attacked the doctrines of the Jesuits in his work *Theologiæ Jesuitarum Præcipua Capita*. About this time a defence of the Jesuits and the council of Trent was published, which drew from him a reply entitled *Examen Concilii Tridentini*, a work regarded to this day by Protestants as an able vindication of the reformed faith. He next took up and defended Luther's views of the communion. He drew up a creed for the churches of lower Saxony, which was generally accepted. He was in favor of the *Formula Concordiæ*, and used his efforts successfully, in conjunction with Andrea, to induce the inhabitants of Swabia, Saxony, and Franconia to accept it as a rule of faith. He was highly esteemed by all parties for his moderation, and received frequent offers of place and emolument; but he invariably declined them, that he might devote himself to theology. He also began to write a work entitled *Harmonia Evangeliorum*, which was continued by Leyser and by Johann Gerhard, and which appeared in Hamburg in 1704. It was translated into German by Nicolai. **II. Philipp Bogislav von**, a German historian, grandson of the preceding, born at Stettin, May 9, 1605, died at Hallstad, Sweden, in 1678. Employed in the military service of Holland, and afterward of Sweden, he attracted the attention of Chancellor Oxenstiern, and at his recommendation Queen Christina appointed him royal councillor and historiographer. He published a history of the war carried on in Germany by the Swedes under Gustavus Adolphus (1648). He is the reputed author of a remarkable work, which appeared under the name of Hippolytus a Lapide, and was entitled *De Ratione Status in Imperio nostro Romano-Germanico*, &c. (2d ed., Freistadt, 1647). French translations of it appeared in 1712, and at the Hague in 1762.

CHEMNITZER, or **Khemnitzer**, **Ivan Ivanovitch**, a Russian fabulist, born in St. Petersburg in 1744, died in Smyrna, March 20, 1784. He was of German descent, began to study medicine, afterward served in the army, and after spending some time in mining employments accepted the office of consul general in Smyrna, where he fell into a state of melancholy from which he never recovered. His fables were published anonymously from 1778 to 1781, and under his name in 1799. Some of them are taken from Gellert and La Fontaine. The best editions are those published in Moscow by Ponomareff in 1836, and in St. Petersburg by Smirdin in 1847.

CHEMOSH (Heb. *Kemosh*), a national god of the Moabites and Ammonites, supposed by Jerome, but without foundation, to be the same as Baal Peor. Gesenius considers him a god of war, deriving his name from *kamash*, to subdue. King Solomon introduced the worship of Chemosh among the Israelites. He was worshipped, according to tradition, under the symbol of a black star; his worshippers went bareheaded, and used no garments sewn with the needle. His name constantly recurs in the inscription of King Mesha on the lately discovered stela, known as the Moabite stone. (See **MOABITE STONE**.)

CHEMUNG, a S. county of New York, bordering on Pennsylvania, bounded E. partly by Cayuta creek, and intersected by Tioga river; area, 513 sq. m.; pop. in 1870, 35,281. The Northern Central and the Erie railroads traverse the county, and the canal from Elmira to Seneca lake partly intersects it. The surface is uneven, and in some places rises into considerable mountains. The country near the river banks is level and alluvial, and these flats are in some places extensive and very fertile. The chief productions in 1870 were 162,434 bushels of wheat, 215,305 of Indian corn, 480,161 of oats, 116,152 of buckwheat, 138,573 of potatoes, 50,066 tons of hay, 1,203,401 lbs. of butter, 48,983 of wool, 475,905 of tobacco, and 33,933 of honey. There were 5,217 horses, 12,257 milch cows, 7,968 other cattle, 15,257 sheep, and 6,990 swine. There were 26 manufactories of carriages and wagons, 4 of boots and shoes, 1 of forged and rolled iron, 4 of tobacco and cigars, 4 of woollen goods, 17 flour mills, 9 tanneries, 32 saw mills, 2 manufactories of bricks, 4 of cheese, 1 of rectified petroleum, 2 of drugs and chemicals, 7 of furniture, 1 of hardware, 5 of iron castings, 3 of machinery, and 3 breweries. Capital, Elmira.

CHENANGO, a S. E. central county of New York; area, 624 sq. m.; pop. in 1870, 40,564. Unadilla river touches its E. boundary; the Chenango and the E. branch of the Susquehanna intersect it; and it is drained and supplied with water power by several smaller streams. The surface is elevated, and in some places broken and hilly. The soil is good, especially near the rivers. The Chenango canal, traversing the county, connects Binghamton with Utica. The Albany and Susquehanna railroad passes through the S. E. corner, and the New York and Oswego Midland, and the Delaware, Lackawanna, and Utica division of the western railroads traverse the county. The chief productions in 1870 were 19,418 bushels of wheat, 228,921 of Indian corn, 584,429 of oats, 398,045 of potatoes, 183,291 tons of hay, 280,114 lbs. of cheese, 5,319,814 of butter, 117,546 of wool, 397,570 of maple sugar, and 586,990 of hops. There were 10,389 horses, 51,294 milch cows, 17,168 other cattle, 26,472 sheep, and 9,521 swine. There were 37 manufactories of carriages and wagons, 37 of cheese, 1 of cotton goods, 14 flour mills, 13 tanneries,

36 saw mills, 4 manufactories of agricultural implements, 14 of furniture, 7 of pig iron and castings, 3 of machinery, 17 of saddlery and harness, 7 of woollen goods, and 2 breweries. Capital, Norwich.

CHENANGO RIVER rises in Oneida co., N. Y., flows S. S. W. through Madison and Chenango cos., and empties into the Susquehanna in Broome co., near the Pennsylvania border. Its whole length is about 90 m.

CHENAUB, Chenab, or Chinab (anc. *Acesines*), the largest of the five rivers of the Punjab, tributary of the Indus; total length about 750 m. The Chenaub rises about lat. $32^{\circ} 48' N.$, lon. $77^{\circ} 27' E.$, in Lahool, S. of Ladakh, and flows N. W. to the borders of Cashmere, and thence mainly S. W. A little below Aknoor it emerges upon the plain of the Punjab, from which point it is navigable for rafts. Still holding a S. W. course, it unites with the Jhylum, and about 50 m. below with the Ravee, and then with the Ghara, or lower Sutlej, from which point it loses its name, and the united stream is called the Punjnad, which flows into the Indus just as it leaves the S. boundary of the Punjab. The water of the Chenaub is red, that of the Ghara pale, and these distinctive colors may be seen for some miles downward in the united stream, the red on the western, and the pale on the eastern side.

CHENAVALD, Paul, a French painter, born in Lyons, Dec. 9, 1808. Previous to the revolution of 1848 he was already known by his pictures of the "Trial of Louis XVI." and "Mirabeau answering the Marquis of Dreux-Brézé." He was now chosen to execute 50 cartoons for the French Pantheon, and selected for his subject the history of civilization from Genesis to the French revolution. Twenty of the cartoons were completed when, in 1853, the Pantheon was restored to the service of religion as the church of Ste. Geneviève. Three of them attracted much attention at the exhibition of 1853. He received the decoration of the legion of honor in 1853, and a medal of the first class at the universal exposition in 1855.

CHENDAREE, Chandairi, or Chunderee, a town and district of Malwa, in the territory of Gwalior, Hindostan, situated near the frontier of Bundelcund, 115 m. S. of Gwalior, and 280 m. S. S. E. of Delhi. The town is large, surrounded by hills and jungles, with which a few fertile tracts are interspersed. Its manufacturing importance, once considerable, has been destroyed by British importations, and its architectural beauty is in ruins; but even in its present decayed state it has many indications of ancient greatness. It has a strong fort, situated on a precipitous hill, connected with another hill by a narrow neck of land having a steep descent on each side. While Malwa remained an independent kingdom, Chendaree was the seat of powerful feudatory chieftains, one of whom, having revolted against the king, Mahmoud Khilji, was besieged in his capital for eight months. The

town afterward became subject to the sovereignty of Delhi, from whom it was taken by the Rajpoots about 1526. Two years later it was seized by the Mogul chief Baber. It was annexed to Bundelcund, was taken about 1816 by Sindia's general Baptiste, passed into the hands of the Mahrattas, and became a haunt of robbers and freebooters. It was then taken under British protection, and finally in 1844 was assigned, with other lands, for the support of the force known as the Gwalior contingent. It was occupied by the sepoy rebels early in 1858. The first brigade of the central India field force was sent against it in March, and the fort was taken on the 17th. The fortifications were destroyed, but a month or two later the rebels again entered the town, to the number, it is supposed, of about 5,000, mostly from Bundelcund. They were driven out by Gen. Smith, May 25.

CHENEVIX, Richard, an Irish author and chemist, of French descent, born in 1774, died in Paris in April, 1830. Among his publications are "The Mantuan Rivals," a comedy, "Henry VII.," a historical tragedy, and an "Essay on National Character." He is chiefly known, however, as a writer on chemistry. His most important works are "Remarks on Chemical Nomenclature according to the System of the French Neologists" (1802); and "Observations on Mineralogical Systems," which first appeared in a French translation in the *Annales de Chimie*.

CHÉNIER. I. Louis de, a French historian, born at Montfort, Languedoc, in 1723, died in Paris, May 25, 1796. Established as a merchant at Constantinople, he was afterward employed there in the French embassy, and subsequently sent on a mission to Morocco, where he was successively consul general and chargé d'affaires. He published *Recherches historiques sur les Maures et l'empire de Maroc* (Paris, 1787), and *Histoire des révolutions de l'Empire Ottoman jusqu'à la mort du sultan Abdül-Hamed* (new ed., 1808). **II. André Marie de**, a French poet, son of the preceding, born in Constantinople, Oct. 29, 1762, guillotined in Paris, July 25, 1794. After completing his education, he entered the military service, but soon resigned his commission and repaired to Paris. In 1784 he travelled through Switzerland, Italy, and the archipelago, to his native city. In 1787 he was made secretary to the French embassy in London, and spent nearly three years in England. On returning to Paris he joined the moderate party, and expressed his disapprobation of the violent measures of the revolutionists, not only in his conversation, but in several articles marked by cutting irony and invective. The revolution of Aug. 10 closed for a time his political career, and he applied himself again to poetry. But when Louis XVI. was arraigned before the convention, Chénier assisted Malesherbes in his defence of the king, and on his condemnation he drew up an address for an appeal to the people. On the assassination of Marat by Charlotte Corday, he was among

the first to applaud the act, thus making himself still more obnoxious to the terrorists. While on a visit to Mme. de Pastoret at Passy, a commissary from the committee of public safety came to arrest that lady. Chénier interfered in her behalf, and was himself arrested and taken to the prison of St. Lazare. There he wrote some of his most bitter poems against the tyrants of the day; at the same time that he composed for the countess de Coigny, one of his fellow prisoners, *La jeune captive*, a poem which alone would have been sufficient to commend his name to posterity. On July 25 he was arraigned before the revolutionary tribunal, and sent forthwith to the guillotine. He preserved his self-possession to the last, suffering death with unflinching courage. An edition of his poems was published in 1820, and various editions have since appeared. The idylls *L'aveugle*, *La liberté*, and *Le jeune malade* are considered his masterpieces. **III. Marie Joseph**, a French poet, brother of the preceding, born in Constantinople, Aug. 28, 1764, died in Paris, Jan. 10, 1811. After leaving college he was for two years an officer; but as early as 1783 he left the military service and devoted himself to literature. His first attempts at tragedy were not successful; but in 1789 he produced *Charles IX.*, a play with marked republican tendencies, which hit the popular vein, and was received with great applause. *Henri VIII.* was performed in 1791, and was succeeded by *La mort de Calas*, both remarkable for purity of style, but above all for democratic aspirations. He also produced the tragedies of *Caius Gracchus*, *Timoléon*, and *Fénelon*, which were proscribed on account of their republican sentiments. He was the author of the *Chant du départ*, which next to the *Marseillaise* is the most celebrated lyric of the revolution. He was chosen to the national convention in 1792, but, although siding with the *montagne* party, he was the first to oppose revolutionary excesses. He was chosen president of the convention in 1795, and afterward became a member of the council of 500. The tragic end of his brother affected him deeply, notwithstanding their political differences. Discontinuing almost his contributions to the stage and his speeches on political subjects, he now confined his activity mainly to the subject of public education. In 1801 he published *Discours sur les progrès des connaissances en Europe, et de l'enseignement public en France*. From 1803 to 1806 he was inspector of public instruction, being at the same time a member of the tribunate. In 1806 and 1807 he delivered a series of historical lectures upon French literature. In 1808, Napoleon having requested the French institute to report upon the recent progress of French literature, the report was written by Chénier under the title of *Tableau historique de l'état et des progrès de la littérature française depuis 1789*, a work remarkable for extensive knowledge, soundness of criticism, and great impartiality. His last performance was another

report upon the decennial prizes. During all this time poetry had not been neglected; he had written several satirical or philosophical epistles, the style of which is at once fervid and classic; the two most remarkable among the number being one addressed to Voltaire, and another *Sur la calomnie*, in which he repelled the calumnies hurled against him in consequence of his brother's death. He has left also several tragedies; one of them, *Tibère*, is pronounced his masterpiece. His complete works were published in 8 vols. 8vo in 1823-'6, with notices by Daunou and Arnaut.

CHENONCEAUX, Castle of. See BLÉRÉ.

CHENOT, Claude Bernard Adrien, a French engineer, born at Bar-sur-Aube in 1803, died in 1855. He entered the mining school in Paris in 1820, after which he was attached to the secretaryship of the department of bridges and roads, and superintended the working of the mines in Auvergne. In 1832 he invented an apparatus for the manufacture of metallic sponges, and afterward obtained sponges from the earthy minerals, as aluminum and calcium, which he made to enter into other combinations, especially with steel, to which he thus gave remarkable properties. Matter in the sponge state, he thought, is the greatest power to which the chemist can have recourse, and he sought to found upon it a new system of metallurgy. He made many experiments for the purification of combustibles and metals.

CHEOPS, an ancient king of Egypt, who reigned several thousand years B. C. and built the first and largest pyramid. Diodorus calls him Chembes or Chemmis, but the name Cheops given to him by Herodotus has superseded all others, and is now universally applied to him and his pyramid. According to Herodotus, he was the first bad king of Egypt. He closed the temples and forbade the people to offer sacrifices, compelling them to labor in his service. He reigned 50 years, and was succeeded by his brother Cephren, who built the second pyramid. The Egyptians hated these kings as tyrants so much that even in the time of Herodotus they did not like to mention their names, but, as he says, "called the pyramids after Philiton, a shepherd who at that time fed his flocks about the place." What this passage means modern scholars have not been able to determine. The most plausible conjecture is that the Egyptians had forgotten who built the pyramids, and ignorantly ascribed them to the foreign conquerors and tyrants called shepherd kings, though it is certain that they were built long before the shepherd kings entered Egypt. Cheops has been identified by modern researches with the Suphis of Manetho (who ascribes to him a reign of 63 years) and the Shufu of the inscriptions; and his brother Suphis II. seems to have reigned conjointly with him and to have contributed to the building of the pyramid, in which they were both buried. The chamber in the great pyramid called the queen's chamber was in

reality that which contained the body of the second Shufu, who, surviving his brother, was considered his successor.

CHEPSTOW, a market town of Monmouthshire, England, on the Wye, and on the railway from Gloucester to Milford Haven, 12 m. S. of Monmouth; pop. in 1871, 6,770. It contains an ancient church, formerly belonging to the Benedictine priory, recently restored to its former splendor, a Catholic and several dissent-



Castle of Chepstow.

ing chapels, and a castle founded in the 11th century by William Fitzosborne, earl of Hereford, rebuilt in the 13th, and still a magnificent pile. On account of the narrowness of the channel here, the tide sometimes rises, it is said, 70 ft., frequently more than 50. The town possesses a large trade in timber, coals, millstones, and iron. There are no manufactures, but ship building is carried on to some extent.

CHER, a river of France, rises in the department of Creuse, flows N., N. W., and W., and after a course of 220 m., during which it describes a semicircle, joins the Loire near Tours. The canal of Berry runs parallel to it in the upper part. Its principal affluents are the Tardes, Arnon, and Saudre. It is navigable 47 m. from the Loire.

CHER, a central department of France, formed of portions of the old provinces of Berry and Bourbonnais, and bordering on the departments of Loiret, Nièvre, Allier, Creuse, Indre, and Loir-et-Cher; area, 2,780 sq. m.; pop. in 1872, 335,392. It is bounded E. by the Loire and intersected by its tributary the Cher, and drained by several other streams. The surface is comparatively level. There are mines of iron, manganese, lead, and coal, and marble and other quarries. It is one of the most important industrial departments of France, having manufactories of iron, woollen, and linen, and of porcelain, glass, and other wares. The most important agricultural productions are wine, grain, cattle, and wool. The department is divided into the arrondissements of Bourges, St. Amand, and Sancerre. Capital, Bourges.

CHERASCO, a town of Italy, in the province of Cuneo, situated on an elevation near the junction of the Stura and Tanaro rivers, 18 m. N. of Mondovì; pop. about 9,000. It contains a college, several palaces, conspicuous triumphal arches, and seven churches, of which that of the Madonna del Popolo is celebrated for its altar. Silk is manufactured, and there is a trade in grain and wine. Organic remains abound in the vicinity, and petrified wood is found in the adjoining hill of S. Bartolommeo. A treaty of peace was signed here in 1631, terminating the Mantuan war of succession between Austria and France. In April, 1796, after the battle of Mondovì, the French troops advanced upon Cherasco, which speedily surrendered, and the Sardinian commissioners concluded an armistice, preliminary to a treaty of peace with Napoleon. The French destroyed the ancient fortifications in 1801.

CHERBOURG (anc. *Coriallum* or *Cortallum*, afterward *Carusbur*), one of the principal seaports and naval stations of France, in the department of La Manche, 185 m. W. N. W. of Paris, with which it is connected by railway; pop. in 1872, 37,357. It is situated on the N. shore of the peninsula of Cotentin, at the mouth of the Divette, in the centre of a bay, the extremities of which are formed by Cape Lévi on the east and Cape La Hague on the west. The roadstead, in a bay at the N. extremity of a narrow promontory, has been formed by the construction of an immense breakwater upward of 2 m. long, running E. and W., partly across its mouth, and composed of two unequal arms, joined at an angle of 170°, with the opening toward the land. This stupendous work, commenced in 1784, was completed in 1854, at a cost of 67,300,000 francs. (See **BREAKWATER**.) The roadstead which it serves to defend has anchorage for 400 large vessels. At each end of the breakwater is an entrance to the harbor 1,000 yards wide. The commercial harbor is at the head of an inner bay at the S. end of the roads, near the mouth of the Divette, and consists of an outer basin communicating with the sea by a channel 656 yards long and 55 yards wide, bordered with long quays, and with an inner floating dock, closed by flood gates. The military port is distinct from this, and lies on the W. shore of the same recess, facing N. E. It comprises three large docks, viz.: an outer one, 984 ft. long and 754 ft. wide; another on the north, communicating with the former, and closed by lock gates; and a third on the west, larger than either of the others, through which it must be entered. All these have been exca-

vated from the solid rock. The first, the construction of which is due to Napoleon I., was inaugurated by the empress Maria Louisa in 1813; the second was commenced the same year; and the third, called the dock of Napoleon III., built of granite masonry, 1,377 ft. long and 600 ft. wide, was begun in 1836, and opened in the presence of the French emperor and empress, Aug. 7, 1858. Its cost was 16,000,000 francs. Brilliant fêtes and rejoicings preceded and followed the ceremony, and the occasion was selected for a visit to the works by the queen of England, for the inauguration of an equestrian statue of Napoleon I., and for the opening of the railway from Cherbourg to Paris. There are six smaller docks or building slips connected with the principal basins, and the dock of Napoleon III. has three of its sides grooved with slips for repairing vessels. These slips, seven in all, are furnished with flood gates, and may be used as dry docks. Sur-

bourg is ill built, but has fine promenades and a handsome theatre, and on the Place d'Armes is a monument commemorating the landing of the duke of Berry in 1814. It is the seat of many foreign consuls, of a maritime prefecture, of civil and marine courts; has a communal college, a public library, and a library connected with the navy. The chief exports are eggs, butter, and cattle. There are some sugar and salt refineries, and manufactures of chemicals, leather, lace, and hosiery. It is estimated that about one half of the population are employed in the navy yard.—As early as the 10th century Cherbourg was very much frequented as a port. When Edward III. of England landed at La Hogue in 1346, Cherbourg was among the first cities of Normandy conquered by the English. It changed hands several times, until it was finally secured to the French by Dunois in 1450. During the seven years' war the English effected a descent on the coast, took the

town, and destroyed all the naval and military works, docks, and arsenals, blowing them up, and burning the lock gates of the harbor with all the vessels in it. The project of creating a harbor of refuge for war vessels was entertained by Louis XIV. as early as 1665, and Vauban was commissioned to draft the plans of a series of improvements and defences; but nothing was done till 1739, when quays and two moles were constructed. From that time the works were continued, with occasional interruptions, until

their completion in 1865. Nearly \$100,000,000 are supposed to have been expended upon them. Violent storms have more than once destroyed the labor of years.—On June 19, 1864, the engagement between the Kearsarge and the confederate steamer Alabama took place off Cherbourg, 9 m. from the harbor, which resulted in the destruction of the Alabama. On Jan. 11, 1866, a violent storm stranded 22 vessels in the road, but caused no injury to the breakwater.

CHERBULIEZ. I. Antoine Élisée, a Swiss political economist, born in Geneva in 1797, died in Zürich, March 4, 1869. In 1833 he became professor of jurisprudence, and in 1837 of political economy, at the high school of Geneva. He took part in public affairs in the conservative interest till the revolution of 1848, when he went to Paris, where he continued to oppose revolutionists and socialists. He returned to Switzerland in 1853, and after teaching for



Town and Harbor.

rounding the basins are workshops, smithies, timber yards, a ropery, furnaces, barracks, a powder magazine, and all the establishments necessary for a naval arsenal, the whole shut in by a strong line of fortifications extending from shore to shore. The town and harbor are defended by a series of formidable works commanding every avenue of approach. On the centre of the breakwater is a strong fort, and on each of its extremities is a battery crossing fire with similar works on the opposite points of land, or intervening islands. The shores of the bay and several rocky islands bristle with the guns of numerous forts, so placed as to sweep every part of the roadstead and harbor; while on the land side the town is surrounded by a double line of 14 star forts and redoubts; making a total of 24 regular works of defence, mounting over 3,000 guns of heavy calibre, which have been erected in different parts of this apparently impregnable position. Cher-

some time in Lausanne became professor of political economy in the national polytechnic institute in Zürich. Among his principal writings, besides many contributions to cyclopædias and periodicals, are *L'Utilitaire* (3 vols., Geneva, 1828-30), and *Précis de la science économique* (2 vols., Paris, 1862).—His brother **ANDRÉ** (born in 1795) has also acquired literary reputation, as well as the younger brother **JOËL** (born in 1806, died in November, 1870). The three sisters, **ADRIENNE** (born in 1804), **CAROLINE** (born in 1800), and **Mme. TOURTE-CHERBULIEZ** (born in 1793, died in 1864), became likewise known by their literary activity, especially the last named, as a writer of popular tales and novels. **II. Victor**, a Swiss author, nephew of André, born about 1832. He has acquired celebrity by a work entitled *À propos d'un cheval, causeries athéniennes* (Geneva, 1860; 2d ed., 1864, under the title *Un cheval de Phidias*), and a series of novels (1863-'9, mostly first published in the *Revue des Deux Mondes*), the most brilliant of which are *Le comte Kostia* (1863) and *Paule Méré* (1864). Among his other works are *Le prince Vitale* (1864), *Le roman d'une honnête femme* (1866), *Prosper Randoce* (1867; English translation, 1868), *L'Aventure de Ladislas Bolski* (1869), and *L'Allemagne politique depuis la paix de Prague* (1870).

CHÉRI, Rose Marie Cizos, a French actress, born at Étampes, Oct. 27, 1824, died at Passy, Sept. 22, 1861. The daughter of an actor, she appeared on the stage in 1830, and was afterward greatly admired in the many cities she visited in company with her father. In 1842 she went to Paris, and appeared twice at the Gymnase theatre, but made so little impression that she was induced to accept an engagement at a salary of less than \$200 a year. She afterward produced a deep impression on the audience, and became a great favorite in Paris. Her salary was increased fourfold, and the most popular dramatists were anxious to have her perform in their plays. Her characteristics were a singular *naïveté* of expression blended with refined and graceful manners. She achieved her greatest triumphs in *Clarisse Harlowe* and *La niaise de St. Flour*, expressly written for her. She also portrayed with great success characters of a different kind in *Le fils de famille*, *Diane de Lys*, and *Le demi-monde*. On May 12, 1845, she married the manager of the Gymnase theatre, M. Lemoine-Montigny, but continued to appear upon the stage under her own name.

CHEROKEE, the name of six counties in the United States. **I.** The S. W. county of North Carolina, bounded N. E. by Graham county; area, 650 sq. m.; pop. in 1870, 8,080, of whom 301 were colored. It is intersected by Hiawasee river and its branches, and borders on Tennessee and Georgia. The surface is mountainous, Unaka or Smoky mountain in the N. W., and the Blue Ridge, near the S. E. border, being the principal ranges. The soil near the

streams is fertile. The chief productions in 1870 were 3,628 bushels of wheat, 8,830 of rye, 162,529 of Indian corn, 18,098 of oats, 10,702 of Irish and 8,588 of sweet potatoes, 560 tons of hay, 19,392 lbs. of tobacco, and 70 bales of cotton. There were 841 horses, 2,042 milch cows, 3,435 other cattle, 6,693 sheep, and 8,735 swine. Capital, Murphy. **II.** A N. W. county of Georgia; area, 620 sq. m.; pop. in 1870, 10,399, of whom 1,281 were colored. The soil is fertile, and the surface diversified by hills and fine rolling lands. In the N. E. part are quarries of excellent statuary marble; gold mines have been opened, and iron, copper, and titanium are also found. The Etowah, the principal river, is navigated by steamboats, and supplies good water power. The chief productions in 1870 were 59,064 bushels of wheat, 168,529 of Indian corn, 22,786 of oats, 11,911 of sweet potatoes, 53,797 lbs. of butter, 18,497 of tobacco, and 347 bales of cotton. There were 725 horses, 1,466 milch cows, 2,658 other cattle, 4,715 sheep, and 9,423 swine. Capital, Canton. **III.** A N. E. county of Alabama, bordering on Georgia; pop. in 1870, 11,132, of whom 1,480 were colored. The former area was 710 sq. m., but a portion has been taken to form Etowah county. The Coosa river, which bisects it, and the Chattooga, one of its affluents, are the principal streams. There are several mountain ranges, and extensive forests of pine oak, &c. The Selma, Rome, and Dalton railroad passes through the S. E. corner. The chief productions in 1870 were 68,530 bushels of wheat, 231,946 of Indian corn, 27,683 of oats, 24,675 of sweet potatoes, 1,807 bales of cotton, and 7,470 lbs. of tobacco. There were 1,406 horses, 772 mules and asses, 2,262 milch cows, 3,968 other cattle, 5,835 sheep, and 11,750 swine. There were 9 flour mills, 3 saw mills, and 1 manufactory of pig iron. Capital, Centre. **IV.** An E. county of Texas, bounded E. by the Angelina river, and W. by the Neches; area, 1,144 sq. m.; pop. in 1870, 11,079, of whom 3,283 were colored. It is well watered, and consists of prairies alternating with woodland, pine and oak being abundant. It is one of the best farming counties in the state. Iron ore is abundant. The chief productions in 1870 were 292,181 bushels of Indian corn, 30,230 of sweet potatoes, and 5,185 bales of cotton. There were 2,448 horses, 4,182 milch cows, 9,143 other cattle, 1,962 sheep, and 22,251 swine. There were an iron foundry, and manufactories of iron castings and machinery. Capital, Rusk. **V.** A N. W. county of Iowa, drained by Maple river, the Little Sioux, and the W. fork of the latter; area, about 600 sq. m.; pop. in 1870, 1,967. The Dubuque and Sioux City railroad passes through it. The chief productions in 1870 were 10,797 bushels of wheat, 21,896 of Indian corn, 6,584 of oats, 6,178 of potatoes, and 4,277 tons of hay. There were 530 horses, 559 milch cows, 998 other cattle, and 353 swine. Capital, Cherokee. **VI.** The S. E.

county of Kansas, bounded E. by Missouri and S. by the Indian territory; area, 604 sq. m.; pop. in 1870, 11,038. The Neosho river skirts the S. W. boundary, and it is watered by Spring river, Lightning creek, and other affluents of the Neosho. The Missouri River, Fort Scott, and Gulf railroad passes through it. The chief productions in 1870 were 54,792 bushels of wheat, 291,916 of Indian corn, 68,059 of oats, 25,603 of potatoes, and 18,883 tons of hay. There were 3,561 horses, 3,002 milch cows, 8,078 other cattle, 2,064 sheep, and 5,791 swine. Capital, Columbus.

CHEROKEES, a tribe of North American Indians, called by themselves Tsaraghee, who when first known by the whites, and down to 1830, occupied the upper valley of the Tennessee river, the mountains and valleys of the Alleghany range, and the head waters of the Savannah and Flint. They form a family by themselves, connected perhaps remotely with the Iroquois. According to their own traditions, they came from the west earlier than the Muskogees, and dispossessed a moon-eyed people unable to see by day. They were reached by De Soto in 1540, but from their interior position came very slightly into contact with the Spanish, English, or French for many years after the settlements began. They consist of seven families or clans, and, as among the Iroquois, no man can marry in his own clan. From their position they were also divided into two sections separated by the Great Unaka or Smoky mountains, viz.: Otari, the mountain, and Erati, below. They lived in small villages scattered along the streams. The western portion were often at war with tribes at the north, as the middle and lower towns were with the Muskogees. The Carolinians who shipped Indian slaves to the West Indies encouraged the tribes near them to attack those more remote, and in 1693 twenty Cherokees complained to Gov. Smith, and asked protection against the Esaus, Congarees, and Savannahs, who had destroyed many of their towns and carried off numbers of their people. Gov. Archdale stopped the practice entirely. In 1716 a party of the western Cherokees killed several French officers near the mouth of the Ohio, after which Louisiana endeavored earnestly to win their friendship; but they adhered to the English, serving against the Tuscaroras under Capt. Barnewall in 1712. A chief named Wousatasate received formal investiture from Gov. Nicholson in 1721. They formally submitted to the English king in 1730, when Sir Alexander Cuming was sent to them, and subsequently took six chiefs to England. A few years after a French agent among them named Preber compiled a dictionary and endeavored to win them to France; but he was seized and carried to Georgia. Two years afterward the Cherokees lost nearly half their population by smallpox. This and wars so diminished their numbers that many of their 64 towns were abandoned. In 1755 they ceded

lands to Gov. Glen, and allowed the erection of English forts on their lands. In 1757 their warriors volunteered to protect the frontiers, and they joined the expedition against the French on the Ohio. On their home march, unprovided by the authorities with rations, and with no harvest in their own fields, they took provisions from the settlers. This led to skirmishes, in which a number of Cherokees were killed. They retaliated, and Gov. Lyttleton marched into their country and imposed terms of peace. But hostilities having been renewed, Montgomery and Grant plundered and destroyed many towns, and the Cherokees took Fort Loudon with its garrison. A second expedition under Grant in 1761 completed their overthrow, and peace was made at Long island in the Holston. The Cherokees had made con-



A Cherokee.

siderable progress previous to this war, which left them without houses, cattle, horses, or implements. During the wars slaves had fallen into their hands, who introduced better cultivation, and thus led to their progress in civilization. Their great chief Oganasdoda soon after visited England. In 1773 Georgia obtained from them the cession of a large tract, the proceeds to be applied to the payment of debts due to traders. At the commencement of the revolution, being under the influence of royal agents, they joined the English, and with the Tories ravaged the frontiers till their country was invaded and laid waste by two columns under Col. Williamson and Gen. Rutherford, when they made peace, surrendering a large tract of land. In 1780 they again took the field and served at Augusta, but were reduced by Gen. Pickens, when Georgia forced them to give up the lands south of the Savannah and east of the Chattahoochee.

By the treaty of Hopewell, Nov. 28, 1785, they acknowledged the sovereignty of the United States, and were solemnly confirmed in the possession of their hunting grounds, embracing much of the present state of Tennessee, with portions of North Carolina, Georgia, Alabama, and Mississippi. Settlements however kept constantly encroaching on these lands, and the Cherokees, advancing in civilization, cultivated more and hunted less. They gave up portions of their territory by the treaties of Holston in 1791 and Tellico in 1798. Owing to this and the general scarcity of game, a portion of the hunters as early as 1790 emigrated beyond the Mississippi, and settled on the St. Francis in the Spanish colony of Louisiana. Some years after a division was made of the property of the tribe between these two parties, and in 1817 the western Cherokees on the Arkansas numbered 3,000, under Takatoka as their chief. The eastern Cherokees, aided by the United States government with agricultural implements, mills, and cotton-cleaning machinery, increased in prosperity; and in 1805, by the treaty of Tellico, for \$14,000 in cash and a perpetual annuity of \$3,000, they ceded a large tract in Tennessee. Although now sedentary and to a considerable extent of mixed blood, the Cherokees were not favorably regarded by Georgia, which demanded their removal in spite of the important services rendered by them in 1812 while serving in Jackson's army, and although by the labors of the Moravian missionaries begun in 1801, followed by the American board of commissioners for foreign missions, the tribe was becoming Christianized. Two parties now arose, the lower towns still clinging to the hunter life, and the upper towns wishing to assimilate to the whites. In the autumn of 1808 delegates of both parties called on the president, the former to express their wish to remove to government lands beyond the Mississippi river. By the treaty of the Cherokee agency, July 8, 1817, lands were ceded to the United States in exchange for lands on the Arkansas and White, government aiding them in transportation. Under this arrangement 3,000 emigrated in 1818. By a treaty the next year making a further cession of lands, the annuities were divided between the eastern and western Cherokees. These continued cessions of land had reduced the Cherokee territory to a mountainous tract of about 8,000 square miles, chiefly within the limits of Georgia. The people of that state still desired their total removal, and actually, by a series of laws officially disregarding their existence as a distinct community, extended jurisdiction over the Cherokee territory, annihilated the tribal government, and by refusing them citizenship, or even the right of being witnesses, placed them in a difficult position. The Cherokees in vain appealed to the United States government; the supreme court of the United States decided that they could not maintain an action in the United States courts,

and the general government admitted its inability to carry out the long series of treaties. Two parties now existed in the Cherokee nation, one led by John Ross opposed to removal, the other under the Ridges and Boudinot in favor of it. At last in 1835 a treaty for general removal was made with a small fraction of the nation, and in 1838 Gen. Scott marched into their country with 2,000 men to enforce it. Their numbers were estimated in all at this time at 27,000, 1,000 remaining undisturbed in North Carolina. The work of removal was committed to the Ross party, who for years were the ruling body and principal medium of treaty with government. Their new site in the Indian territory was further west than the lands given to the western Cherokees, and comprised 9,776,000 acres. Here all their educational and mission works were restored, and provisions supplied for one year. The eastern Cherokees had adopted a constitution and laws which were here put in force, but the western branch opposed them and wished to maintain their old style of government; while in the former body the Ridges still kept up a distinct party. The feuds between the three parties led to acts of violence. In June, 1839, Major Ridge, his son John, and Elias Boudinot were assassinated, and the Ross party became supreme. An act of union between the eastern and western Cherokees was then made, July 12, 1839. In their new home Congregational, Moravian, Baptist, and Methodist mission influence continued hopefully. The printing press, established at Union in 1835 and then removed to Park Hill, continued its work, publishing newspapers and many religious works, partly in English and partly in Cherokee, using for the latter the syllabic characters invented in 1821 by a member of the tribe. (See GUESS, GEORGE.) Salt works, the raising of grain, cotton, cattle, and horses, and the annual annuities, had in 1861 brought them to a high degree of prosperity. The Indian agents being all southern, the Cherokees of all factions at first joined the confederates by treaty of Oct. 7, 1861. Regiments raised by order of the Ross party fought against the United States at Pea ridge; but seeing the struggle doubtful, 9,000 under Col. Downing, the second chief, with a majority of the nation, abandoned the southern cause and came within the Union lines. The remainder, 6,500, chiefly of the Ridge party, adhered to the end to the southern confederacy. In consequence the Ross party confiscated all their lands. The Cherokee territory was now ravaged by both armies, houses and mills were destroyed, and cattle and stock driven off or killed, to the amount of \$2,000,000. The war also resulted in the emancipation of their slaves. The government regarded the Cherokees as having forfeited their lands by rebellion, and imposed the condition that they should give the negroes a portion of their lands or forfeit certain funds held by government.—In 1867 the Cherokees,

by the most accurate census made for many years, numbered 13,566, and the latest estimates give them only 14,682; while in 1853 they numbered 17,367, besides 710 in Haywood co., N. C. Affairs between the Cherokees and the United States were regulated by treaty July 19, 1866, in which protection was given to the Ridge party, some lands were given up to the government, and others set apart for churches and schools. Their country, E. of lon. 96° W. and south of lat. 37° N., now comprises about 5,000,000 acres, two thirds of it being unfit for cultivation. The Cherokee national, orphan, and school funds, held by the United States government, amount to \$1,580,975 35. Their language comprises two dialects, calling each other Oonusta, and a third now lost was called Gidoowa. Although many works have appeared in Cherokee, there is no grammar or dictionary printed. There are some notes on the grammar in the "Cherokee Phoenix" and the *Archæologia Americana*. Under their present constitution they are governed by a national committee and council, elected for two years by the eight districts into which the territory is divided. The executive is called the "principal chief of the Cherokee nation," and is elected for four years. A bill in congress has proposed the erection of the Indian territory into a territorial government under the name of Oklahoma, giving access also to whites; but the Cherokees in 1873 joined the Creeks and Choctaws in an earnest protest against it.

CHERRY. The common cherry tree (*prunus cerasus*, Linn.; *cerasus vulgaris*, Loud.) is of Asiatic origin, and is said by Pliny to have been introduced into Italy by Lucullus from Cerasus in Pontus during the Mithridatic war, about 70 B. C., and about 120 years afterward it was

now reckoned in catalogues. The branches are spreading, horizontal, or slightly inclining upward in the larger trees, and drooping in the smaller ones; the flowers are in subsessile umbels, somewhat stalked; the leaves are ovate-lanceolate, smooth, folded together, and of lightest color in the largest varieties; and the fruit is round or heart-shaped, commonly red, but passes into all shades between that color and dark purple. The wood is of a reddish hue, hard and tough, and much used by the cabinetmaker; the gum which exudes from the bark is edible; and the fruit is eaten either fresh or dried, and is made into preserves. The cherry tree is best propagated by grafting on seedlings of the wild cherry.—The wild cherry tree (*cerasus Virginiana*, Loud., and *prunus serotina*, Ehrhart) is one of the largest American forest trees, sometimes attaining a height of 100 ft., with a trunk 3 or 4 ft. in diameter. It is found from Mexico to Hudson bay, and abounds in the



Wild Cherry (*Cerasus Virginiana*).



Common Cherry.

introduced into Britain. It is extensively cultivated in the temperate regions of Europe and America. The Romans recognized eight varieties of it, and more than 300 varieties are

middle states, and in Kentucky and Ohio. Its wood is compact, fine-grained, and of a dull, light red tint, which deepens with age. It takes a brilliant polish, and is not likely to warp. It is employed by cabinetmakers for almost every species of furniture, and when selected near the ramification of the trunk it rivals mahogany in beauty. Where it abounds, it is used in ship building and for the felloes of wheels. The fruit is purplish black, slightly bitter, and is used for flavoring brandy. This tree is cultivated in Europe for ornament.—The choke cherry (*prunus Virginiana*, Linn.) has often been confounded by botanists with the preceding. It is a tall shrub, seldom a tree, with greenish bark, oblong, sharply serrate teeth, and red fruit, turning to dark crimson, and very astringent till perfectly ripe. It is common on river banks W. of the Alleghanies, and along the Atlantic parts of America, especially northward. Its bark is known to physicians as a tonic. Its fruit affords nour-

ishment to birds, which are said to be sometimes affected by it with a sort of intoxication. —The *prunus avium* (Linn.), or *cerasus sylvestris* (Loud.), is the wild cherry tree of England and continental Europe, and in favorable situations acquires a height of 60 or 70 ft. in about 50 years. Its fruit is known in England by the name of *gean*, and is highly prized in France for the food it supplies to the poor. It is also used to make jelly and cherry brandy. Its wood is manufactured into furniture and musical instruments. Wine casks made of it are said to improve the flavor of wine kept in them.

CHERRY LAUREL (*prunus lauro-cerasus*, Linn.), called in England the common or broad-leaved laurel, is a native of the Levant, and was brought from Constantinople to Holland in 1576. It has racemose flowers, pale evergreen oblong-lanceolate leaves, and is so hardy that neither frost nor drought seems to affect



Cherry Laurel (*Prunus lauro-cerasus*)

it. It is now one of the most popular evergreens in English pleasure grounds, and is almost as common in shrubberies as the rose. Its leaves are poisonous from the abundant hydrocyanic acid which they contain, and should be used with caution. By distillation the laurel water of commerce, the German *Kirschwasser*, and other poisonous cordials, are obtained from them. The fresh leaves are often employed to give a flavor to culinary preparations.

CHERSON. See **KHERSON.**

CHERSONESUS, or **Chersonese** (Gr. *Χερσόνησος*), the ancient designation for a peninsula. The word is not used generally of all peninsulas, and the ancients do not appear to have regarded all such pieces of land partially surrounded by water as we should now designate as peninsulas, in that light. Spain, for instance, and Italy, they never seem to have looked at in their general conformation. What they generally regarded as a chersonese appears to have been a long narrow strip of

land, with its projecting length far exceeding its breadth. Of the larger peninsulas of antiquity four were known as chersoneses, besides many smaller ones scarcely exceeding what we should now call promontories or headlands, the latter word exactly corresponding with what the Greeks called *ἄκρα*. Three of these four have an elongated shape, the other being nearly an irregular parallelogram, connected by a narrow neck with the mainland, and all have narrow straits connected with them, which in two instances are termed *bospori*. The first is the Thracian Chersonese, now the peninsula of Gallipoli, commonly known to the Greeks as the Chersonesus emphatically; being the long, narrow strip of land running out southwesterly from the mainland of Thrace, between the Hellespont, now Dardanelles, and the gulf of Melas, now of Saros. Not many leagues distant, at the eastern extremity, is the Thracian Bosporus, now the strait of Constantinople. The second is the Tauric Chersonese, the modern Crimea, which alone has not the elongated shape, but is somewhat fashioned into the semblance of a trapezium. It has, however, a narrow channel, the strait of Yenikale, which is also a bosporus, called the Cimmerian for distinction, across which, before the earliest historic ages, the Scythian Cimmerii are said to have been conducted by a heifer; as in later times the Huns are reported to have been introduced under the same guidance. The third is the Cimbric Chersonese, or Jutland with the main part of Schleswig, which has the above described shape and the narrow strait, probably called the Cimbric Bosporus, between its right flank and the island of Fünen, known as the Little Belt. The last is the Aurea Chersonesus, or Golden Chersonese, the modern peninsula of Malacca.

CHERTSEY (Anglo-Saxon, *Ceorles Eye*, or island), a town of England, in Surrey, situated on a slip of land between the right bank of the Thames and the brook from Virginia water, 22 m. S. W. of London; pop. in 1871, 9,305. A stone bridge with seven arches here connects the counties of Surrey and Middlesex. The town is irregularly laid out, but the streets are paved, and most of the houses are of brick, and it is surrounded by villas. The parish church of St. Anne, partly rebuilt in 1806, has a square embattled tower and a tablet in memory of Charles James Fox, who resided in the neighborhood. The poet Cowley secluded himself in the latter part of his life in the so-called Porch house, Guildford street, where he died. There are a number of educational, charitable, and other institutions, among which is one endowed in 1725 by Sir William Perkins, providing hundreds of children with education, and a number of them also with clothing. The principal trade of the town is in malt, flour, tiles, and bricks, of which latter articles great quantities are made. Vegetables are raised extensively for the London market, and there are annual cattle and sheep fairs, and weekly

markets. The town grew out of a monastery founded in 666, and rebuilt in 964 by King Edgar and the Benedictine monks. No traces of the abbey exist, and the remains of Henry VI. were removed thence to Windsor by Henry VII. Chertsey was a capital of the South Saxon monarchs during the heptarchy.

CHERUB (in Scripture more frequently in the Hebrew plural form, *cherubim*), a symbolical figure of a composite form, which finds a parallel in the composite mythological figures of Assyria, Egypt, Persia, and Greece, of which traces remain in the winged bulls and lions of Nineveh and the sphinxes of Egypt. The most famous cherubim of Scripture were those of gold placed upon the cover of the ark in the tabernacle, facing each other, and apparently adoring an unseen divinity. In the temple of Solomon a pair of colossal size overshadowed the ark with the canopy of their contiguously extended wings. Cherubim were also blazoned on the doors, walls, and curtains of the building. As to the form of the cherubim in the temple there has been much discussion, with no definite result, except a general conclusion that the images were in shape and arrangement very similar to the Assyrian and Egyptian remains referred to above, some of which show a remarkable agreement with the expressions of Scripture. In the sacred boats or arks of the Egyptians represented on the monuments, there are sometimes two figures with extended wings which remind us of the description of the cherubim "covering the mercy seat with their wings, and their faces one to another." Whether the symbolical images were merely symbolical, or were meant to represent beings of actual existence, is uncertain; although a common opinion is that they are ideal representations of the power and wisdom of the Deity. The word cherub (Heb. *kerub*) has been variously explained as meaning strong, great, near, boylike, carven, and grasping or laying hold on. The last meaning, which seems preferable to the others, is chiefly supported by Fürst, who compares the root of the Hebrew *kerub* with similar words in the same language, and with the Sanskrit *grībh* and Persian *giriften*, to seize, Greek *γρῦψ*, griffin, and the Teutonic *grip*, *greifen*, and *Greif*. The cherubim were always made in pairs, as if to preclude the supposition of an idol which a single figure might have suggested, and in an attitude of subordination to a higher power and glory, setting the example of worship rather than receiving it themselves. They stood like the supporters of a shield, and were repeated in many places about the sacred building like a heraldic device. Yet, perhaps because the priests only entered the holy place, and the ark was covered when moved, their form seems to have been generally unknown. There is mention of cherubim guarding the gates of Eden after the expulsion of Adam, and they also appear in the prophetic visions of Ezekiel and John. In the prophetic visions there

seems in them an entire absence of human sympathy, and even on the mercy seat they appear not merely as admiring and wondering, but as guardians of the covenant and avengers of its breach. In painting and sculpture, the name cherub is given to the winged heads of children which represent angels.

CHERUBINI, Maria Luigi Carlo Zenobio Salvatore, an Italian composer, born in Florence, Sept. 8, 1760, died in Paris, March 15, 1842. He studied under his father, who was a pianist, and in 1769 under Bartolommeo and Alessandro Felici, also under Pietro Bizzari and Giuseppe Castrucci. In 1773 he produced a mass, which, with other of his compositions, attracted the attention of the grand duke Leopold, who enabled him to become a pupil of Sarti of Bologna, under whom he studied from 1778 to 1782. As early as 1780 he produced his first opera, *Quinto Fabio*, at Alessandria, and in 1784 he had already produced eight operas in the theatres of Italy. In that year he went to London, but in 1786 took up his residence in Paris. In 1785 he composed for the London Italian opera *La finta principessa* and *Giulio Sabino*; in 1788 at Turin his *Ifigenia in Aulide*; and in the winter of the same year he brought out his *Demophoon*, and in 1791 his *Lodoïska*, at Paris. The latter opera established his fame, and was followed by *Élisa*, *Médée*, *L'hôtellerie portugaise*, *Les deux journées*, *Anacréon*, and his ballet of *Achille à Scyros*. In 1806 he produced *Faniska* at Vienna; in 1809, *Pimmalion* at Paris; in 1813, *Les Abencerrages*; in 1814, *Bayard à Mézières*, in conjunction with Cutel, Boïeldieu, and Nicolo; in 1821, *Blanche de Provence*, in concert with Paër, Boïeldieu, Berton, and Kreutzer; and in 1833, *Ali Baba*. He excelled most in sacred music. His celebrated mass in F for three voices, his grand *Requiem*, and his *Messi sacre* are the noblest monuments of his genius. Haydn and Beethoven pronounced him the greatest sacred composer of the age. From 1822 till his death he was director of the conservatory of Paris, with which he had been connected from the date of its foundation in 1795, and which is greatly indebted to him for its prosperity. Among his pupils were Boïeldieu, Auber, Carafa, and Halévy. Cherubini was never in favor with Napoleon, but from 1816 to 1830 he was superintendent of the music of the king. Adolphe Adam wrote of him after his death: "Contemporary of Haydn, Mozart, Beethoven, and Rossini, Cherubini seems to have been placed by nature among those great geniuses as a moderator, whose wisdom and firmness were destined to counteract their eccentricities."—The most important of Cherubini's literary works is *Méthode de contre-point et de fugue*, published in 1835, containing a summary of the lessons in strict composition which for several years he had given at the conservatory. He was enthusiastically devoted to his profession, and his independence frequently manifested itself.

CHERUSCI, a German tribe, celebrated for their great victory over the Romans under Varus. They are first mentioned by Cæsar. They dwelt on both sides of the Weser, bordering S. on the Suevi, from whom they were separated by the Baccenis forest, probably the western part of the Thuringian mountains, N. E. on the Elbe and the Longobardi, N. W. on the Angrivarii, and S. W. on the Catti. The elder Drusus first led a Roman army through their country, advancing as far as the Elbe; but their ensuing subjection to the empire was soon ended by the great German conspiracy under Arminius, and the destruction of the legions of Quintilius Varus in the Teutoburg forest, in the year 9 of the Christian era. The dissensions, however, which broke out between Arminius and Segestus, his father-in-law, allowed Germanicus to invade their country in the years 15 and 16. He defeated Arminius, but was soon compelled to return. In 17, the Longobardi having gone over from the league of the Marcomanni to that of the Cherusci, Arminius was victorious over Marbod (Maroboduus), the king of the Marcomanni. After the death of Arminius intestine struggles weakened the power of the Cherusci; an ensuing period of peace made them indolent and unwarlike, according to Tacitus, but they still appear as an important people in several later leagues of the Saxon tribes, in whose general name they became merged. They are last mentioned by Claudian, toward the close of the 4th century.

CHERVIN, Nicolas, a French physician, celebrated for his researches into the nature and treatment of yellow fever, born at St. Laurent d'Oingt, near Lyons, Oct. 6, 1783, died at Bourbonne-les-Bains in 1843. In pursuance of his inquiries into the types of fevers, and particularly of typhus, he spent some time in the military hospitals of Mentz, and formed the opinion that typhus is not contagious, but appears so from its rapid propagation. In 1819, Dr. Lassus having contended that yellow fever is no more contagious than typhus, Chervin determined personally to investigate the subject. With this view he set out for the West Indies, and visited successively Santo Domingo, Guadeloupe, Martinique, New Orleans, and Cayenne. During his five years' search he only met with the disease in sporadic cases, never in its epidemic form; but by thoroughly investigating these, and secretly dissecting several bodies, he became convinced that yellow fever is non-contagious. On his return to France he was made a member of the legion of honor, but passed the rest of his life in great poverty, writing innumerable papers to prove that yellow fever is not contagious, and that quarantine regulations neither prevent nor check it.

CHÉRY, Philippe, a French painter, born in Paris, Feb. 15, 1759, died Feb. 28, 1838. Espousing the cause of the revolution, he took a part in the capture of the Bastille, and was successively a member of the convention, member of the first committee of public safety, mayor

of Charonne and Belleville, and chief of police in the department of the Seine. Banished by Bonaparte after the 18th Brumaire, he did not return to France till 1802. His historical paintings gained for him a high reputation.

CHESAPEAKE BAY, the greatest inlet in the Atlantic coast of the United States. It enters Virginia between Cape Charles and Cape Henry, and extends into Maryland. Its length, following the curve, is about 200 m.; its breadth varies from 4 to 40 m. There is sufficient depth of water for the largest ships to ascend the main bay almost to the mouth of the Susquehanna. The Chesapeake is remarkable for the vast number of arms or estuaries, of various dimensions and of irregular shapes, which mark the line of its shores. Some of these serve as outlets to the rivers of Virginia and Maryland, while others are fed by no permanent streams, but are mere indentations in the coast. Southwest of Cape Henry the rivers and sounds of the Atlantic coast are shallow, and there are few good harbors; but the Chesapeake forms the first of a series of deep and commodious bays which extend along the coast, at no great distance from one another, from Virginia to the N. E. extremity of the United States.

CHESEBRO', Caroline, an American authoress, born in Canandaigua, N. Y., March 30, 1825, died at Piermont, Feb. 16, 1873. Her first stories and sketches appeared in 1848. Her writings are remarkable for purity of diction and the effective use of simple materials. Among them are: "Dreamland by Daylight" (1851); "Isa, a Pilgrimage" (1852); "Children of Light" (1853); "The Little Cross-Bearers" (1854); "The Fisherman's Daughter" (1855); "The Beautiful Gate" (1855); "Victoria, or the World Overcome" (1856); "Amy Carr, or the Fortune-Teller" (1863); "Peter Carradine, or the Martindale Family" (1863); and "The Foe in the Household" (1871). She was for several years a teacher in the Packer collegiate institute, Brooklyn, and contributed regularly to various periodicals.

CHESHIRE, the S. W. county of New Hampshire, bounded S. by Massachusetts, and separated from Vermont on the W. by the Connecticut river; area, 770 sq. m.; pop. in 1870, 27,265. It is drained by the Ashuelot and some smaller streams. The Connecticut is navigable by boats the whole length of the county. The surface is hilly and beautifully diversified by a number of lakes and ponds, and there are some mountains of considerable elevation, the principal of which are Grand Monadnock and Ashuelot. The soil is good, and the river bottoms especially are very fertile. The Cheshire and Ashuelot railroads traverse the county. The chief productions in 1870 were 5,369 bushels of wheat, 7,165 of rye, 146,040 of Indian corn, 104,601 of oats, 263,791 of potatoes, 56,975 tons of hay, 63,278 lbs. of cheese, 531,601 of butter, 110,529 of wool, 151,189 of tobacco, and 227,701 of maple sugar. There

were 3,645 horses, 7,162 milch cows, 3,211 working oxen, 9,171 other cattle, 80,237 sheep, and 3,493 swine. There were 3 manufactories of cotton goods, 16 of furniture, 4 of sashes, doors, and blinds, 38 of wooden ware, 17 of woollen goods, 58 saw mills, 12 tanneries, 6 currying establishments, 3 manufactories of agricultural implements, 7 of boxes, 10 of carriages and wagons, 1 of glassware, 3 of iron castings, 7 of machinery, 1 of wrapping paper, and 4 of hardware. Capital, Keene.

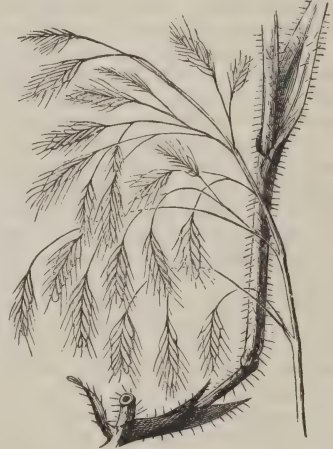
CHESHIRE, or **Chester**, a N. W. county of England, bounded N. by the Irish sea and the estuary of the Mersey; area, 1,105 sq. m.; pop. in 1871, 561,131. It has a level surface, diversified with small lakes called meres, is well wooded, and watered by the Mersey, Dee, and Weaver. It has a clayey or sandy soil; is one of the chief grazing districts of England, and noted for its excellent cheese. Salt, coal, lead, and copper are obtained in plenty, and there are several important manufacturing towns in which silk and cotton fabrics are made to great extent. It is traversed by numerous railways, among which are the North-western, Manchester, and Birmingham, the Chester and Crewe, the Cheshire and Midland, and the Stockport and Liverpool, and by the Grand Trunk and Bridgewater canals. Cheshire was the seat of the ancient Cornavii, and was made a county palatine by William the Conqueror. It remained almost independent of the crown until the time of Henry VIII., and its palatine courts subsisted to the reign of George IV. The county is divided into North Cheshire, Mid-Cheshire, and South Cheshire, each of which is entitled to two members of parliament. Capital, Chester.

CHESNEY, Charles C. See supplement.

CHESNEY, Francis Rawdon, a British soldier, pioneer of the overland route to India, born at Ballyrea, Ireland, in 1789, died Jan. 30, 1872. He entered the army in 1805, became captain in 1815, projected and conducted the Euphrates expedition in 1835-'6, and was brigadier general of artillery in China in 1843-'7, and in the south of Ireland 1848-'52. He became major general in 1855 and a full general in 1868. He wrote "Expedition for the Survey of the Euphrates and Tigris" (1860), "Observations on the Past and Present State of Firearms" (1852), "Russo-Turkish Campaigns of 1828-'9" (1854), and "Narrative of the Euphrates Expedition" (1868).

CHESSE, and **Brome Grass**, common names of several species of the genus *bromus*, belonging to the natural order *gramineæ*, or grasses, and tribe *festuceæ* (fescue grass, &c.). In the wheat-raising districts of the United States the name chess is given particularly to *B. secalinus*, which is also called cheat, and, from its introducer into this country as a grass of supposed value, Willard's bromus. Among the characteristics of the genus are: spikelets with 5 to many flowers, panicle; glumes not quite equal, shorter than the flowers, mostly keeled,

the lower with 1 to 5, the upper with 3 to 9 nerves; the flowers lanceolate, compressed; the palea herbaceous, the lower keeled, 5-9-nerved, awned or bristle-pointed from below the tip; the upper palea finally adherent to the grain; stamens 3, styles attached below the apex of the ovary. The grasses of this genus are coarse, with large spikelets, generally somewhat drooping when ripe. The species most known in Great Britain are the *B. erectus*, straight, 2 to 3 ft. high; *B. asper*, 4 to 5 ft.; *B. sterilis*, 1 to 2 ft.; and *B. diandrus*, rarely met.—Of the *B. secalinus*, or chess proper, specific characters are: a spreading panicle, slightly drooping; spikelets ovate, smooth, of a yellowish green tinge, holding 6 to 10 rather distinct flowers. The stems are erect, smooth, round, 2 to 3 ft. in height, bearing 4 or 5 leaves with striated sheaths; joints 5, slightly hairy; leaves flat, soft, linear, their points and margins rough to the touch. This plant is annual,



Chess (*Bromus asper*).

flowering in June and July; but in some cases in which it is cut sooner, or otherwise fails to produce seed, it survives, and matures the second year. Chess is a source of annoyance particularly in grain fields, most of all in those of wheat, since it is difficult to separate its seed, having nearly the size but without the plumpness of barley, from the cultivated grains. The notion of many farmers that wheat which has been injured by frost in the autumn or otherwise arrested in its growth is liable to turn to chess, and that of others that the chess grains themselves never grow, are of course wholly without foundation. Some years since the cultivation of chess as a valuable grass for cattle, like millet, lucerne, &c., was recommended by many persons in this country, probably in ignorance of its really worthless quality, and high prices were charged for the seed; whence doubtless arose its present wide diffusion. It has been supposed that by many who thus disseminated the plant it was mistaken

for the *B. arvensis*, the only species of brome grass at all suitable for cultivation, but which is itself now wholly displaced by more desirable sorts of grasses. In experiments that have been tried with the chess, cattle have been found to prefer to it almost every sort of fodder, save oat straw and corn stalks. It is the farmer's true interest, indeed, to keep his fields as clear as possible of all the species of brome grass.—Among the other species known in the United States are the upright chess (*B. racemosus*), the soft chess (*B. mollis*), declared by some

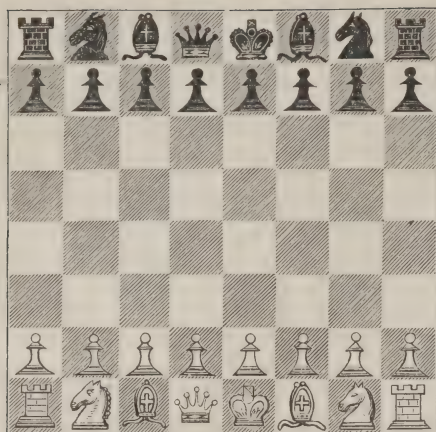


Soft Chess (*Bromus mollis*).

authorities to be poisonous, the wild chess (*B. Kalmii*), the fringed brome grass (*B. ciliatus*), the meadow brome grass (*B. pratensis*), and the field brome grass (*B. arvensis*). From this last the *B. secalinus* is distinguished by the spikelets of the former having fewer florets, and its outer palea being rounded at the summit.

CHESS (Fr. *échecs*, It. *scacco*, Ger. *Schach*, from Persian *shah*, king, the principal piece in the game), the oldest and most scientific of sedentary amusements, originated in India about 5,000 years ago. Its history may be divided into three periods: 1. The age of the *chaturanga*, or primeval Indian game, extending from its origin down to about the 6th century A. D. In the *chaturanga* the moves of the men were almost the same as in the present game, but it was played by four persons, and the combatants determined what piece to move by the throw of a die. 2. The age of the *shatranj*, or mediæval game, embracing the period between the 6th and 16th centuries. In the *shatranj* the game was reduced to a contest between two persons, and the element of chance was discarded. Early in this stage of its history the game passed eastward into China and Japan, where in the lapse of time it has been considerably modified, and westward through Persia and Byzantium into Europe, where it became during the middle ages the favorite indoor pastime of the court and the cloister.

3. Modern chess includes the period from the commencement of the 16th century to the present day. It is distinguished by some changes in the fundamental laws of the game, such as an increase in the powers of the queen and bishop, and the introduction of castling.—Chess is now cultivated by all civilized nations, and its theory and practice have been investigated by innumerable writers of ability. The most prominent are, among Asiatics, Ali Shatranji, Suli, Damiri, Sokeiker, Rhazes, Ibn Sherf Mohammed, and Ghulam Kassim; and among Europeans, Jacobus de Cessolis, Conrad von Ammenhusen, Alfonso the Wise, Lucena, and Vicent, before the close of the 15th century; Damiano, Ruy Lopez, and Gianuzio, in the 16th century; Salvio, Carrera, Augustus duke of Brunswick, Greco, and Saul, in the 17th century; Bertin, Stamma, Philidor, Del Rio, Lolli, Ponziani, Cozio Stein, Zuylen van Nieveld, and Allgaier, in the 18th century; and Koch, Sarratt, Cochrane, Lewis, Bilguer, Von der Lasa, Bledow, Alexandre, Walker, Jänisch, Calvi, and Staunton, in the 19th. The poetry of chess has been illustrated by Vida, Middleton, Tuccius, Kochanowski, Sir William Jones, Cerutti, Méry, D'Arblay, Slous, Tomlinson, and others. Sarrasin, Fréret, Hyde, Severino, Leibnitz, Jones, Wahl, Twiss, Madden, Bland, and, most thoroughly of all, Forbes, have explored its history. The most famous players of the last 400 years have been Paoli Boi, Leonardo da Cutri, Salvio, Del Rio, and Dubois, of Italy; Ruy Lopez and Xerone, of Spain; Legal, Philidor, Deschapelles, and La Bourdonnais, of France; Cunningham, Stair, Janssen, Sarratt, McDonnell, and Staunton, of England; Allgaier, Bilguer, Hanstein, Mayet, Von der Lasa, Anderssen, Lange, and Harwitz, of Germany; Petroff and Kieseritzky, of Russia; Szén and Löwenthal, of Hungary; Stein, of Holland; Stamma, of Syria; and Morphy, of the United States. During the present century the popularity of the game has largely increased, owing to the establishment of chess periodicals, to the interest attaching to public contests between great players or between different clubs, and to the influence of assemblies or conventions of amateurs, such as the tournament held at London in 1851, and the congress which met at New York in 1857.—Chess is played by two persons on a board of 64 alternately white and black squares, each player having 16 men, 8 pieces and 8 pawns. The player, having placed the board so that he has a white corner square at his right hand, may place the white men as follows: the queen's rook in the left hand corner nearest him; the queen's knight in the square next to it; then successively the queen's bishop, the queen, the king, the king's bishop, the king's knight, and the king's rook, until he reaches the right side of the board. The white pawns are then placed on the 8 squares immediately in front of the pieces; and the black pieces and pawns are to be arranged in the same manner on the opposite side of the board.



Chess Board.

The following rules describe the moves of the men and the laws of the game:

1. The rook moves in straight lines parallel with the sides of the board. 2. The knight moves from the square upon which it stands, to any one of a different color, at a distance of three squares, counting the one from which it starts. 3. The bishop moves diagonally, forward and backward, in a line composed of squares of a like color. 4. The queen moves at pleasure, either like the rook or bishop. 5. The king moves one square in any direction. All the pieces capture in the same direction in which they move. 6. The pawn moves directly forward; its first move may be either one or two squares, but each succeeding move is limited to one square. The pawn captures diagonally, to the right or left, one square forward. All the men capture by removing the captured man and placing the capturing one on the square thus rendered vacant. No man can pass over any occupied squares, except the knight, the move of which piece has no such restriction.—Castling is a double move of the king and rook at the same time. Castling on the king's side is performed by moving the king to king's knight's square (g 1 or g 8), and the king's rook to king's bishop's square (f 1 or f 8); on the queen's side, by moving the king to queen's bishop's square (c 1 or c 8), and the queen's rook to queen's square (d 1 or d 8). Castling is permitted to either player once during the game, under the following conditions: 1. Neither of the castling pieces can have been moved; 2. the squares between the king and the rook must be vacant; 3. the king must not be in check; 4. the squares upon which the king and rook, after castling, are to stand, must not be commanded by any of the adverse men.—When a pawn, in moving two steps, passes over a square commanded by an adverse pawn, it may be captured by the adverse pawn in passing, in the same manner as if it had moved but one square. When a player has no other move at command, capturing the pawn in passing is compulsory.—Every pawn, upon reaching the eighth or last rank, ceases to be a pawn, and must be immediately exchanged for a queen, a rook, a bishop, or a knight, even though none of these pieces may have been previously lost.—A man touched must be moved, and an adversary's man touched must be captured, unless the player touching the man previously says, *J'adoube* (or, I replace).—Whenever a player attacks the adverse king, he shall audibly utter the word "Check!" either just before or at the time the attacking move is made.—The king is checkmated when he is attacked by any of the adverse men, and cannot in any way escape from the attack. Checkmate finishes the game, and should always be audibly announced. But whether it be announced or not, the game is equally won by the mating player. No game can be won except it end with a checkmate.—The game is drawn, or won by neither party, in the following cases: 1, when one player gives perpetual check, or when both players insist upon a continual repetition of the same moves; 2, when either king is stalemated, that is, when the king of one of the players is not in check and cannot move to any square not commanded by an adverse man, and when that player possesses no other man which can be legally moved; 3, when neither party possesses a force sufficient to effect mate.

In recording games it is usual to style the square upon which the king stands the king's

square; the one immediately in front, the king's second square, &c. The different methods of commencing a game are styled openings, and have frequently received names from their inventors or chief illustrators. The most common openings are the following:

Philidor's Defence.

- | WHITE. | BLACK. |
|---------------------|------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. Kt. to K. B. 3d. | 2. P. to Q. 3d. |

Giuoco Piano.

- | | |
|-----------------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. Kt. to K. B. 3d. | 2. Kt. to Q. B. 3d. |
| 3. B. to Q. B. 4th. | 3. B. to Q. B. 4th. |
| 4. P. to Q. 3d or Q. B. 3d. | |

Evans Gambit.

- | | |
|---------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. Kt. to K. B. 3d. | 2. Kt. to Q. B. 3d. |
| 3. B. to Q. B. 4th. | 3. B. to Q. B. 4th. |
| 4. P. to Q. 4th. | |

Ruy Lopez Knight's Game.

- | | |
|----------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. Kt. to K. B. 3d. | 2. Kt. to Q. B. 3d. |
| 3. B. to Q. Kt. 5th. | |

Scotch Gambit.

- | | |
|---------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. Kt. to K. B. 3d. | 2. Kt. to Q. B. 3d. |
| 3. P. to Q. 4th. | |

Petroff's Defence.

- | | |
|---------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. Kt. to K. B. 3d. | 2. Kt. to K. B. 3d. |

King's Bishop's Opening.

- | | |
|---------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. B. to Q. B. 4th. | 2. B. to Q. B. 4th. |

King's Knight's Gambit.

- | | |
|---------------------|----------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. P. to K. B. 4th. | 2. P. takes P. |
| 3. Kt. to K. B. 3d. | 3. P. to K. Kt. 4th. |
| 4. B. to Q. B. 4th. | 4. B. to K. Kt. 2d. |

Muzio Gambit.

- | | |
|---------------------|----------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. P. to K. B. 4th. | 2. P. takes P. |
| 3. Kt. to K. B. 3d. | 3. P. to K. Kt. 4th. |
| 4. B. to K. B. 4th. | 4. P. to K. Kt. 5th. |
| 5. Castles. | 5. P. takes Kt. |

Allgaier Gambit.

- | | |
|---------------------|----------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. P. to K. B. 4th. | 2. P. takes P. |
| 3. Kt. to K. B. 3d. | 3. P. to K. Kt. 4th. |
| 4. P. to K. R. 4th. | |

Bishop's Gambit.

- | | |
|---------------------|------------------|
| 1. P. to K. 4th. | 1. P. to K. 4th. |
| 2. P. to K. B. 4th. | 2. P. takes P. |
| 3. B. to Q. B. 4th. | |

Queen's Gambit.

- | | |
|---------------------|------------------|
| 1. P. to Q. 4th. | 1. P. to Q. 4th. |
| 2. P. to Q. B. 4th. | |

French Game.

- | | |
|------------------|-----------------|
| 1. P. to K. 4th. | 1. P. to K. 3d. |
|------------------|-----------------|

Sicilian Game.

- | | |
|------------------|---------------------|
| 1. P. to K. 4th. | 1. P. to Q. B. 4th. |
|------------------|---------------------|

Chess problems are positions supposed to have occurred at the ends of games, in which one party agrees to checkmate or draw the game in a certain number of moves. The following are specimens:

I.—By Cook.

WHITE.—K. at K. Kt. 5th, Q. at K. B. 8th, Rs. at K. 5th and Q. R. 6th, B. at Q. Kt. 7th, Kt. at Q. 4th, P. at Q. B. 3d.
BLACK.—K. at Q. 3d, B. at Q. 4th, Kt. K. 2d, Ps. at Q. Kt. 3d, Q. B. 5th, and Q. 2d. White to play and mate in two moves.

II.—BY LOYD.

WHITE.—K. at Q. B. 7th, Q. at Q. Kt. 2d, R. at K. Kt. 8th, Kt. at K. B. 2d.

BLACK.—K. at K. Kt. 7th, Ps. at K. Kt. 6th and K. B. 5th. White to play and mate in three moves.

—In the numerous legends and curious anecdotes which adorn its annals, in its venerable nomenclature, which has been transmitted through all the changes of language, from the earliest tongues of the Indo-European stock to the latest, in its singular combination of idle amusement and mental toil, and in the fascination which it has ever exercised over its votaries, chess forms a remarkable chapter in the history of the world. Monarchs like Haroun al-Rashid, Charlemagne, Tamerlane, Charles XII., Frederick the Great, and Napoleon I., and philosophers like Leibnitz, Voltaire, Rousseau, and Franklin, have found delight in its study and pleasure in its practice. Alone among games its use has been sanctioned by the priesthood of all beliefs, Catholic, Protestant, Buddhist, and Moslem. Erudite writers have illustrated its history, and acute intellects have elaborated its theory, until it has at length become the subject of a large and pleasant literature.

CHEST. The human body being commonly divided into head, trunk, and limbs, these again are subdivided into head and face, chest and abdomen, upper and lower limbs. The chest, then, is the upper portion of the trunk, to which are attached externally the breasts in front, and the arms and shoulders laterally and posteriorly, and the cavity of which contains internally the heart and lungs. The walls of the chest are composed mainly of the ribs and the muscles pertaining to the ribs; the dorsal portion of the spinal column completes the walls of the chest behind, and the sternum completes them in front. The neck connects the chest with the head, and the midriff or diaphragm divides internally the cavity of the chest from that of the abdomen. The upper portion of the chest, between the spine, first ribs, and the sternum, forms an aperture through which the trachea passes into the chest, and the great arteries and veins of the head, neck, and arms pass out of the chest from the heart and main vessels. The spaces between these vessels and the bones are occupied by the œsophagus, by certain nerves and muscles, and by what is termed cellular or connective tissue. The whole chest thus forms a cavity closed on all sides, but allowing the passage of certain tubes or vessels through the upper and the lower portion of its walls, such as the trachea, œsophagus, blood vessels, nerves, &c. This cavity contains within it three subordinate cavities, the middle one containing the heart sheathed in the pericardium, and the two cavities at the sides containing the lungs, sheathed by the pleural serous membranes, and called the pleural cavities. Each lung is suspended, as it were, in its appropriate cavity by its bronchus from the trachea, and by the trunks of its pulmonary artery and veins, which,

bound together by connective tissue, form what is called the root of the lung. For the sake of easy motion, the wall of the cavity is lined, and the surface of the lung is covered by a smooth membrane called the pleura, the contiguous surfaces of which are moistened with serous fluid to prevent friction from alternate respiratory motions of the chest and lungs. The pleural cavities being completely closed on all sides, no air can enter them, but the lung in each cavity communicates with the external air by means of its bronchial tubes leading to the trachea and larynx, through which the air passes, not into the cavity of the chest, but into the interior of the lung. In their medium state, the lungs of a person of ordinary size and in good health contain about 200 cubic inches of air. In easy breathing, about 20 cubic inches is drawn into them at each inspiration; but this may vary considerably, according to the efforts made in muscular exertion, or during singing, or before coughing. The limit which the rigidity of the walls of the chest sets to the elastic collapse of the lungs is never reached in ordinary respiration, and the lungs accordingly are never entirely emptied of air.

CHESTER. 1. A S. E. county of Pennsylvania, bounded S. and S. E. by Maryland and Delaware, N. E. by the Schuylkill river, W. by Octorara creek, and drained by French, Elk, and the sources of Brandywine creeks; area, 738 sq. m.; pop. in 1870, 77,805. It formed one of the three original counties of the province established by William Penn in 1682. The surface is much diversified. A rich limestone valley about 2 m. wide, extending from the Schuylkill to the Susquehanna, divides the county into two nearly equal parts, of which the southern is rolling or gently undulating, with rich deposits of chromate of iron, valuable porcelain clay, and gneiss; while the northern is rugged, and contains gneiss, sandstone, red shale, copper, and abundance of lead and iron. The N. W. boundary is formed by a low ridge called Welsh mountain. Besides the minerals above mentioned, there are silver, zinc, titanium, zircon, agate, chalcodony, amethyst, sapphire, and beryl. The valley yields excellent limestone and marble. Agriculture is carried to great perfection. The county is traversed by the Pennsylvania Central and Waynesborough branch, the West Chester and Philadelphia, and the West Chester railroads, and by the Philadelphia and Baltimore Central railroad. The Philadelphia and Reading railroad passes along its N. E. border. Valley Forge and Paoli, of revolutionary fame, are in this county, which also contains the birthplace of Gen. Anthony Wayne. The chief productions in 1870 were 753,803 bushels of wheat, 1,540,125 of Indian corn, 1,034,430 of oats, 404,363 of potatoes, 114,898 tons of hay, 2,848,243 lbs. of butter, and 31,776 of wool. There were 14,086 horses, 32,670 milch cows, 21,916 other cattle, 13,069 sheep, and 28,165 swine. There were 32 manufactories of car-

riages and wagons, 14 of brick, 5 of cotton goods, 6 of hubs and wagon material, 13 of iron, 1 of nails and spikes, 8 of iron castings, 19 of lime, 5 of machinery, 26 of paper, 10 of woollen goods, 7 wool-carding and cloth-dressing establishments, 99 flour mills, 6 tanneries, and 23 saw mills. Capital, West Chester. **II.** A N. county of South Carolina, bounded E. by the Catawba, and W. by Broad river; area, 570 sq. m.; pop. in 1870, 18,805, of whom 12,513 were colored. The surface is uneven, but the soil is fertile. The Charlotte, Columbia, and Augusta, and the King's Mountain railroads traverse it. The chief productions in 1870 were 32,210 bushels of wheat, 169,379 of Indian corn, 22,496 of oats, 13,464 of sweet potatoes, and 7,042 bales of cotton. There were 1,292 horses, 1,781 mules and asses, 2,550 milch cows, 2,085 other cattle, 1,933 sheep, and 6,856 swine. Capital, Chesterville.

CHESTER, a city of Delaware co., Penn., situated on the Delaware river and on the Philadelphia and Wilmington railroad, 10 m. S. W. of Philadelphia; pop. in 1870, 9,485. It is the oldest town in the state, having been settled by the Swedes in 1643, and was originally called Upland. The provisional assembly was held here under the government of William Penn in 1682. It was the county seat of Chester co. until Delaware co. was organized in 1789. In 1871 there were 23 schools, of which 2 were high schools, 26 teachers, and 465 male and 464 female pupils in attendance. Three weekly newspapers are published.

CHESTER, an episcopal city, port, and parliamentary and municipal borough of England, capital of Cheshire, and a county in itself, situated on the Dee, 17 m. S. S. E. of Liverpool, and 164 m. N. W. of London; pop. in 1871, 35,701. It was a Roman station called Deva or Deva Castra; was known to the Britons as *Caer Leonvawr*, and by the Saxons was styled *Legancaster* or *Legecester*. It stands on a high rock, nearly encompassed by the Dee, and is surrounded by walls and towers, the substructure of which is probably Roman, while the upper portion dates from the time of Edward I. These walls are in excellent preservation, and are thought to be the most perfect remains of ancient fortification in England. They are from 5 to 8 ft. thick, and on their summit is a walk with parapets, from which may be obtained extensive and beautiful views. The space which they enclose is a parallelogram, planned like the Roman camps, with a gateway in the middle of each side, and two main streets intersecting at right angles in the centre of the town. These are remarkable for being sunk far below the lowest inhabited portions of the houses, and below the footways, which are within piazzas called rows. The latter consist of broad paved walks underneath the second floors of the houses, with balustrades in front, and shops on the inner side. There are stairways at intervals leading down to the road. The side streets run at right angles. A

supply of water is obtained from the Dee. The town contains many curious wooden dwelling houses of venerable age, perhaps the most interesting of which is Stanley house, a very ancient



Watergate Row, Chester.

three-gabled building, ornamented with elaborate carving. It is now occupied by the Chester archæological society. A round tower connected with the city walls bears an inscription stating that from its summit King Charles beheld the defeat of his army on Rowton Moor in 1645. In Bridge street are a Roman *hypocaustum* and sweating chamber in remarkably



Stanley House, Chester.

good preservation. The castle, originally built by Hugh Lupus, earl of Chester, and governor of the province under William the Conqueror, has been almost wholly reconstructed in mod-

ern times, and is now used as the shire hall, county jail, armory, and barracks. Near the castle a handsome stone bridge crosses the Dee with a single arch of 200 ft. span. The Chester and Holyhead railway, which has here one of the largest stations in the kingdom, also crosses the Dee on an iron girder bridge. The cathedral, originally the abbey of St. Werburgh, built for the Benedictines in 1095 by Hugh Lupus, assisted by St. Anselm, is a remarkable Gothic structure, full of interesting memorials. There are 11 other churches, 9 of which are parochial, the most important being St. John's collegiate church, once considered the cathedral. It is a very ancient building, and was mentioned in the Domesday survey. It was formerly partly in ruins, but has been thoroughly restored. The restoration was commenced in 1868, and the completion was celebrated in January, 1872. The arches and piers of the nave are probably Norman; the choir has been rebuilt, and the transepts were entirely destroyed at the reformation. The Roman Catholics and dissenters have a number of places of worship. There is a grammar school, founded in the time of Henry VIII., and called the king's school, under the direction of the dean and chapter of the cathedral. Among the other institutions are a normal college, many charity schools, an infirmary, house of industry, almshouses, linen hall, exchange, union hall, and commercial hall, mechanics' institute and museum, a government school of art, library, savings bank, theatre, and public baths. There are three public parks and a cemetery in the environs, and not far distant are Saughton Grange, a curious manor house once belonging to the abbey of St. Werburgh, and Eaton hall, the seat of the marquis of Westminster. Famous races have been held here from a remote date. Fairs for the sale of cheese take place monthly, other fairs three times a year, and markets twice a week. Ship building, formerly on the decline, has been revived by judicious improvements in the river Dee. The manufactures include rope and sail making, paint, shot, lead pipe, whips, thread, gloves, and tobacco. The shipping trade is almost exclusively coastwise. The exports are cheese, lead, calamine, copper plates, cast iron, and coal; the imports, butter, provisions, hides, tallow, timber, iron, hemp, hops, wine, and oil. Chester is connected by the Ellesmere canal with Liverpool, and by railway with Liverpool, Holyhead, Shrewsbury, and Crewe. Recently various alterations and improvements have been made in the town; many new buildings have been erected, including a town hall at a cost of \$100,000, a market hall, two extensive hotels, and several chapels. Chester gives the title of earl to the prince of Wales, and sends two members to the house of commons.—In 1858 was published in London, "The Mediæval Architecture of Chester," by J. H. Parker.

CHESTERFIELD. I. A S. E. county of Virginia, bounded S. by the Appomattox, and N.

E. by James river; area, 300 sq. m.; pop. in 1870, 18,470, of whom 8,733 were colored. The surface is uneven and most of the soil poor, though the river bottoms are fertile. Coal is found in large quantities. It is traversed by the Richmond and Petersburg railroad and Clover Hill branch; the Richmond, Danville, and Piedmont railroad passes through the N. part. The chief productions in 1870 were 46,408 bushels of wheat, 150,485 of Indian corn, 74,475 of oats, and 194,510 of tobacco. There were 925 horses, 1,580 milch cows, 1,082 other cattle, 2,122 sheep, and 6,693 swine. There were 5 manufactories of cotton goods, 2 of chewing and smoking tobacco, 5 flour mills, 1 manufactory of iron castings, 1 of prepared husks, 1 of twine, 1 of wooden ware, 1 tannery, and 2 saw mills. Capital, Chesterfield Court House. II. A N. E. county of South Carolina, bordering on North Carolina, bounded S. W. by Lynch's creek, N. E. by Great Pedee river, and drained by a number of small streams; area, 868 sq. m.; pop. in 1870, 10,584, of whom 4,309 were colored. It is much diversified by hills and valleys, and fertile near the streams. The Cheraw and Darlington railroad passes through it. The chief productions in 1870 were 21,921 bushels of wheat, 118,129 of Indian corn, 22,550 of oats, 19,949 of peas and beans, 52,732 of sweet potatoes, 2,457 bales of cotton, and 10 hhds. of sugar. There were 804 horses, 2,606 milch cows, 5,678 other cattle, 3,396 sheep, and 13,316 swine. Capital, Chesterfield Court House.

CHESTERFIELD, a town, parish, and municipal borough of Derbyshire, England, situated on the Midland railway, at the junction of the rivers Hipper and Rother, 20 m. N. of Derby; pop. in 1871, 11,426. It is tolerably well paved, lighted with gas, and supplied with water. The houses are of brick or stone, irregularly but substantially built, and roofed with tiles or slates. The parish church, a Gothic building of the 13th century, with a twisted spire 230 ft. high covered with lead, two other churches, a new and an old town hall, various chapels, a handsome school house for a free grammar school founded under Elizabeth, alms houses, a savings bank, and a mechanics' institute, are the chief buildings of note. The manufactures are lace, silk, gingham, and earthenware. Considerable trade is carried on in malt, and there are coal mines, quarries, and smelting furnaces in the vicinity. The Chesterfield canal connects the town with the river Trent.

CHESTERFIELD, Philip Dormer Stanhope, fourth earl of, born in London, Sept. 22, 1694, died March 24, 1773. He was educated at Cambridge, and early entered public life, having been elected to the house of commons before he was of age. By the death of his father he became an earl in 1726, and in the following year was sworn a privy councillor, and in 1728 was sent ambassador to Holland, where he remained four years. He was sent as ambassador a second time to Holland in 1745, but re-

turned in a few weeks, to assume the viceroyalty of Ireland, where he distinguished himself by a firm and enlightened administration. George II. recalled him from Ireland in April, 1746, and appointed him principal secretary of state. He retired from official life in 1748, but still continued to give attention to public affairs until incurable deafness caused him to pass into private life. In 1751 he introduced into parliament, together with the earl of Macclesfield, the bill for the reformation of the calendar, in favor of which he made an elaborate and convincing speech. He was remarkable for sparkling wit, elegant manners, solid talents, and attention to business. Besides his fame as a diplomatist and a statesman, he has a reputation as the author of a remarkable series of letters on a large range of social, philosophical, literary, and political topics, written to his son, and published after his death by that son's widow. Their moral tone is low, their chief object being to inculcate a refined selfishness, but they contain many valuable suggestions on manners. A collection of his letters to other individuals, and of his speeches and miscellaneous writings, has been published, full of wit, knowledge of the world, and tersely expressed views of the public men of Europe. The best editions of Lord Chesterfield's letters and miscellanies are by Lord Mahon (London, 1845 and 1853).

CHESTERFIELD INLET, an arm branching from the N. W. angle of Hudson bay, British America, 250 m. long, and 25 m. across at its widest part. It receives the waters of several rivers, and contains numerous small islands.

CHESTER-LE-STREET (Saxon, *Coneceastre*), a parish and village of England, county of Durham, on a Roman military road, and near an ancient Roman station, 6 m. N. of the city of Durham; pop. of the parish in 1871, 33,287. Its parish church, dedicated to St. Cuthbert, whose remains are said to have rested here for 113 years before their removal to Durham, and to St. Mary, is an imposing Gothic building, with a handsome tower, and a spire 156 ft. high. It contains the stone effigies of the lords of Lumley, 14 in number, from Lyulph, the Saxon founder of the family, to the time of Elizabeth. The see of a bishop was removed hither from Lindisfarne about 880, and remained till 995, when the prelate and clergy were expelled by the Danes. The bishopric was then fixed at Durham. The village is lighted with gas, and contains manufactories of rope, nails, and tiles. There are coal mines, brass and iron works, corn mills, paper mills, fire-brick yards, a steam engine manufactory, and a productive salt spring in the vicinity. Near here also are Lumley castle, a seat of the earl of Scarborough, Lambton hall, belonging to the earl of Durham, and Ravensworth castle. The first mentioned is an interesting building, supposed to have been founded in the 14th century.

CHESTNUT (*castanea vesca*, Linn.; *castanea vulgaris*, Lamb.), a large and handsome tree,

valuable both for its timber and fruit, and growing wild in Europe and the United States. Its foliage is ample and graceful, with long patulous boughs; oblong-lanceolate leaves, serrate with pointed teeth, and smooth and green on both sides; clusters of sterile flowers in long, cream-colored, cylindrical catkins; and fertile flowers two or three together in an ovoid prickly involucre at the base of the catkins. There is no corolla; the calyx is 5 or 6 lobed, placed on the summit of the 3-7 celled ovary, and enclosing 5-20 stamens, and 3-7 bristle-shaped stigmas; the nut is ovoid, coriaceous, and farinaceous. The chestnut is among the most beautiful of forest trees, and is conspicuous in the landscapes of Salvator Rosa and other masters. It is common in the forests of southern Europe from the Caucasus to the Atlantic, preferring deep sandy soils and the sides of mountains, and avoiding marshy regions. It is said to have been found by the Romans



Chestnut (*Castanea vesca*).

first at Castanea, a town of Thessaly, near the mouth of the Peneus, whence the fruit was named by them *Castanea nux*. Some of the oldest and largest trees in the world are of this species. One of the most famous is that on Mount Etna, which has often been described by travellers, and can be seen from Aci Reale. It is 160 ft. in circumference, and has a hollow trunk, the interior of which serves as a retreat for shepherds and their flocks. It is called the hundred-horse chestnut, from a tradition that Joanna of Aragon once visited it, accompanied by all the nobility of Catania, and that the whole party found protection beneath it from a sudden storm. One of the oldest chestnut trees in England is at Tortworth, in Gloucestershire, which was a boundary mark in the reign of King John; and in France there is a remarkable one at Sancerre, which is believed to be about 1,000 years old, and is still very productive. The chestnut furnishes an excellent and durable timber, which has been thought to be the material of the roof of



Chestnut Tree of Mount Etna.

Westminster abbey, and of the church at Great Yarmouth, erected in the reign of William Rufus; but the wood of both those buildings is more probably a species of oak. The fruit is eaten either raw, boiled, or roasted, or is ground into meal, and puddings, cakes, and bread made from it. It abounds especially in France, on the banks of the Rhine, and on the slopes of the Jura, the Pyrenees, and the Alps; and of the numerous French varieties the most esteemed is the *marron*. The American chestnut has sometimes been separated from the European as a distinct species, but upon insufficient grounds.

Chinquapin (*Castanea pumila*).

It has, however, smaller and sweeter nuts. It is found in rocky or hilly woods from Maine to Michigan and Kentucky, and its wood is chiefly in esteem for posts and rails to construct fences.

It is also used for the commoner kind of cigar boxes. The European chestnut was introduced into Virginia by Jefferson in the latter part of the last century.—There is a smaller American species, the chinquapin nut (*castanea pumila*, Michaux), found from Ohio to southern Pennsylvania, growing from 6 to 20 ft. high, having its leaves whitened-downy underneath, and a solitary nut not half so large as the common chestnut, and very sweet and agreeable to eat.—An infusion of the bark of the chestnut has been occasionally employed in medicine. Its action is that of a moderate astringent and tonic, but it has never been much used.

CHETAH. See LEOPARD.

CHEVALIER, Michel, a French political economist, born in Limoges, Jan. 13, 1806. He studied at the polytechnic and the mining schools, and was appointed engineer in the department of Le Nord. After the revolution of July, 1830, he joined the disciples of Saint Simon, and was intrusted with the editorship of their official organ, the *Globe*. He participated in all the proceedings of the apostles of the new faith, and shared the penalties they incurred, being sentenced to a year's imprisonment; but he was leniently dealt with by the government, and released at the expiration of six months. He was sent to the United States by M. Thiers, then minister of commerce, to investigate the American system of railroads. He arrived in New York toward the end of 1832, travelled during two years over the United States, Mexico, and Cuba, and published the results of his observations in a series of letters in the *Journal des Débats*, which were in 1836 collected under the title of *Lettres sur l'Amérique du Nord*. Another work, *Des intérêts matériels en France*, which

appeared in 1838, a brilliant sketch of the internal improvements planned by M. Molé, was received with equal favor. In 1840 Chevalier entered the council of state and the superior board of agriculture and trade, succeeded M. Rossi in the professorship of political economy at the collège de France, and a few months later was promoted to the rank of chief engineer of mines. In his *Histoire et description des voies de communication aux États Unis* (2 vols., 1840-'42), he gives a full account of American railroads, with a view of their influence upon social intercourse. His lectures at the collège de France became very popular, and he continued his contributions to the *Journal des Débats*. In 1845 he was elected to the chamber of deputies by the department of Aveyron; but his free-trade doctrines prevented his reelection. He became the standard-bearer of the free-trade party, advocating his opinions in occasional pamphlets in the *Débats* and in the *Revue des Deux Mondes*. In the latter periodical, after the revolution of 1848, he opposed the doctrines supported by Louis Blanc in the conferences at the Luxembourg; the papers directed against the socialist apostle were entitled *Question des travailleurs*, and had their complement in the *Lettres sur l'organisation du travail*, which appeared in the *Débats*. This contest, in which Chevalier evinced anti-revolutionary sympathies, caused his dismissal from his professorship during the provisional government; but he afterward regained official favor, and was reinstated in his chair at the collège de France, and his seat at the council of state. In 1851 he was elected a member of the academy of moral and political sciences. He was one of the commissioners of the universal exposition of 1855 in Paris, and was president of the French division of the jury at the exhibition in London in 1862. In 1860 he assisted Mr. Cobden in negotiating the commercial treaty between France and England; and the same year he was appointed senator, and took a prominent part in the discussion of important subjects relating to finance and industry. To him was intrusted the publication of the official report on the different classes of articles exhibited at the universal exposition of 1867 in Paris, and he wrote the introduction, in which the entire subject of modern industry is philosophically treated. This was published in 1868 under the title *Exposition universelle de 1867 à Paris, rapports du jury international*. In 1866 he was a member of the commission to investigate the state of agriculture, and in 1869 was made president of the international league of peace. Besides the works already mentioned, he has published *L'isthme de Panama, suivi d'un aperçu sur l'isthme de Suez* (1844); *La liberté aux États Unis* (1849); *Examen du système commercial connu sous le nom de système protecteur* (1851); *Questions politiques et sociales* (1852); *La question de l'or* (1853); *De la baisse probable de l'or, &c.* (1857); *L'expédi-*

tion du Mexique (1862); *Le Mexique ancien et moderne* (1863); *Cours d'économie politique* (3 vols., 1842-'50; new ed., 1866); and *La guerre et la crise européenne* (1866). Many of his works have been translated into English.

CHEVERUS, Jean Louis Anne Madeleine Lefebvre de, a French prelate, the first Roman Catholic bishop of Boston, Mass., born at Mayenne, Jan. 28, 1768, died at Bordeaux, July 19, 1836. After completing his classical and theological studies, he was admitted to the priesthood in 1790, and officiated for some time as a curate at Mayenne; but on his refusal to take the oath ordered by the assembly, he went to England, and became a teacher of French and mathematics in a private Protestant school. In 1795 he proceeded to the United States, and joined the Catholic mission at Boston. The members of that church were then but few in number; his well directed efforts gathered new adherents, while his affability, simple and winning manners, fluency of speech, and inexhaustible benevolence, made him popular even among other religious denominations. From Boston he went to Newcastle, Maine, where he founded a Catholic church, and spent three months in missionary labors among the Indians on the Penobscot river, and in the vicinity of Passamaquoddy bay. He was recalled to Boston, where the yellow fever was then raging with great severity, and gave renewed evidence of courage, devotion, and benevolence, which extended to all persons without distinction of creed. When he opened a subscription for the building of a Catholic church in Boston, he found assistance among Protestants, President John Adams heading the list. In 1808 he was appointed by Pius VII. first bishop of Boston, and was consecrated as such notwithstanding his entreaties and objections. He continued to attend to the humblest duties of the ministry, and to visit every year the Penobscot Indians. After living in Boston for nearly 30 years, he was recalled to France by Louis XVIII., who in 1823 appointed him to the bishopric of Montauban. The vicinity of that town having been devastated by a flood, the bishop opened his residence as an asylum to all the sufferers. His popularity throughout France became at least equal to that he had enjoyed in America. A vacancy having occurred in the archbishopric of Bordeaux, he was appointed to that office, and was at the same time created a peer of France by Charles X. His career at Bordeaux was signalized by the establishment of several charitable institutions. When the cholera broke out in that city his palace was again turned into a hospital, and at the entrance he caused to be inscribed the words, *Maison de secours*. He was also instrumental in calming the exasperation of the people, who attributed the disease to poisoning. On the revolution of July he lost his rank as peer of France, and declined receiving it back at the hands of Louis Philippe. He had no taste for offices or honors of any kind, but could not prevent the king

from soliciting for him the dignity of cardinal, to which he was appointed Feb. 1, 1836; but he died of apoplexy within less than six months. Two translations of his life by M. Hamon of St. Sulpice (under the name of J. Huen-Dubourg) have appeared in the United States.

CHEVES, Langdon, an American statesman, born at Rocky River, S. C., Sept. 17, 1776, died at Columbia, June 25, 1857. He received little early education, but was admitted to the bar in 1800, and rapidly attained eminence. In 1808 he was elected from Charleston to the general assembly, of which body he became a leader. He was a representative in congress from 1811 to 1816, and was a zealous supporter of the party which carried the declaration of war. His speech on the merchants' bonds in 1811 was admired both for its ability and eloquence. He was chairman of the naval committee in 1812, and of the committee on ways and means in 1813, and constantly opposed the restrictive system. When Henry Clay was sent as commissioner to Ghent, Mr. Cheves succeeded him as speaker of the house, being elected by the federalists combined with the anti-restriction democrats over Felix Grundy, the candidate of the strict administration party. He retained this office till 1815, and not one of his decisions was reversed by the house. The bill for the recharter of the United States bank in 1815 was lost by his vote. He voted first to make a tie, and then gave a second and casting vote to defeat it. Declining a reelection to congress after the close of the war, he was chosen one of the superior judges of the courts of law of South Carolina. The national bank having been rechartered in 1816, that institution under injudicious management had become hard pressed and was on the verge of stoppage in 1819, when Cheves was elected president of its board of directors. By a rigorous system of retrenchment, and by making credits only upon sufficient securities, the bank was saved, and specie payment maintained at the principal centres of commerce. Resigning this arduous office after three years, he became chief commissioner under the treaty of Ghent for settling some of its provisions. He returned to South Carolina, where he devoted himself to his plantation, and though retaining his interest in public affairs, declined to accept public office. Although as early as 1830 he had favored a withdrawal of the South from the Union, he was opposed to the scheme of nullification of 1832. Though advocating a southern confederacy, he opposed the unsupported action of a single state as suicidal. In 1850 he became a delegate to the Nashville commercial convention, and in 1852 was a member of the state convention of South Carolina, in which he exerted his influence against the idea of separate state secession. As a literary man he is known not only by his speeches, but by many occasional letters and reviews. He was buried with public honors in the Magnolia cemetery, near Charleston.

CHEVIOT HILLS, a mountain range, extending about 35 m. from N. E. to S. W. between Northumberland, England, and Roxburghshire, Scotland. They afford good pasturage for sheep, and give their name to a fine breed of that animal. They were the scene of many bloody battles between the Scotch and English, the most famous of which is that immortalized in the celebrated ballad of "Chevy Chase." Cheviot peak, 15 m. E. of Jedburgh, is 2,677 ft. high.

CHEVREUL, Michel Engène, a French chemist, born at Angers, Aug. 31, 1786. Having completed his studies in the central school of Angers, he studied chemistry under Vauquelin in Paris, and afterward took charge of the laboratory of that chemist. In 1810 he became preparator of the chemical course in the museum of natural history, and in 1813 professor in the lycée Charlemagne. In 1824 he was appointed director of the dye works and professor of special chemistry at the Gobelins, where he distinguished himself by important researches on colors. In 1826 he became a member of the academy of sciences, and in 1830 succeeded Vauquelin as professor of applied chemistry in the museum of natural history. He was afterward made fellow of the royal society of London and president of the society of agriculture. In 1851 he was awarded a premium at the London industrial exhibition for the benefit his labors had conferred on industry, and in 1852 he received from the society for the encouragement of useful inventions the prize of 12,000 francs for his work *Recherches chimiques sur les corps gras d'origine animale*, which had been published in 1823, and which is yet of high value, its suggestions having given rise to the manufacture of stearine candles, and to the use of oleic acid in the preparation of wool for cloth. Another work of his, on sanitary influences, introduced the practice of charring the interior of water casks. He was a member of the international jury at the universal exhibition of 1851 in London, and of 1855 in Paris. He was appointed director of the museum of natural history for five years in 1864, and again in 1869. Besides many articles on scientific subjects in the *Dictionnaire des sciences naturelles*, the *Journal des Savants*, and other periodicals, he has published numerous works, among which are: *Leçons de chimie appliquée à la teinture* (1828-'31); *De la loi du contraste simultané des couleurs et de l'assortement des objets coloriés* (1839); *Des couleurs et de leurs applications aux arts industriels à l'aide des cercles chromatiques* (1864); *Considérations sur l'histoire de la partie de la médecine qui concerne la prescription des remèdes* (1865); and *Histoire des connaissances chimiques*, the first volume of which appeared in 1866. Many of these works have been translated into various European languages. He has also contributed many important papers to scientific societies, and in 1873, at the age of 86, was still lecturing on chemistry.

CHEVREUSE, Marie de Rohan Montbazou, duchess de, a French woman celebrated for her beauty, wit, and intrigues, born in December, 1600, died at Gagny, near Chelles, Aug. 12, 1679. When scarcely 17 years old she married the duke de Luynes, grand constable of France, who died four years afterward. She next became the wife of Claude de Lorraine, duke de Chevreuse. A great friend of Anne of Austria, she incurred the hatred of Richelieu, and became so obnoxious to him that he determined to have her arrested; but, made aware of his project, she assumed man's attire, crossed the Somme by swimming, and fled to England. For years she was an exile from France, and Louis XIII. had been inspired by his minister with such fear of her uncontrollable spirit and cunning, that in his will he forbade her return to France. Anne allowed her to return, however, but the queen's coldness induced the duchess again to leave the court. Afterward she engaged in new plots against Mazarin, mostly acting in concert with the cardinal de Retz, and was once more compelled to leave France. Her intriguing spirit outlived her beauty, and she wandered through the Netherlands, Germany, and England, still plotting against her enemies.

CHEWINK, a name popularly given to the ground robin or towhee bunting (*pipilo erythrophthalmus*, Vieill.), from its usual note. It belongs to the family of *fringillidae* or finches, and the genus includes several species. The chewink is about $8\frac{3}{4}$ inches long, the wing $3\frac{3}{4}$, and the tail a little over 4 inches. The upper parts generally, head and neck all round, and



Chewink.

upper part of breast, are glossy black, sharply defined against the pure white which extends to the vent, but is bounded on the sides and under the wings by light chestnut; wings and tail black marked with white; iris red, as the specific name implies. The bill is stout and curved, the feet large with strong curved claws, and the tail considerably longer than the wings. The female is brown where the male is black. It is a common bird in America east of the Missouri, generally seen upon the ground among low bushes; its song is sweet and mellow. The nest is on the ground, in a small hole made for

the purpose, and the four to six eggs are pale flesh-colored, with dark spots. Two or three broods are raised in a season. Similar species are found west of the Rocky mountains, in California, and in Mexico. The food consists of worms and insects, in the search for which it seems so entirely absorbed that it may be very closely approached. It goes south in October, returning in the spring.

CHEYENNE, a S. W. county of Nebraska, bounded W. by Wyoming and S. by Colorado, and intersected by the N. and S. forks of the Platte; area, about 6,000 sq. m.; pop. in 1870, 190. The Union Pacific railroad runs E. and W. through the S. portion. Capital, Sidney.

CHEYENNE, the capital of Wyoming territory and seat of justice of Laramie county, situated on the Union Pacific railroad, in the S. E. part of the territory, 516 m. by rail W. of Omaha, Neb., and 1,260 m. E. of Sacramento, Cal.; pop. in 1870, 1,450; in 1873, about 2,500. The city is built on a broad open plain, about 6,000 ft. above the sea; Crow creek, an affluent of the South Platte, winds around it on two sides. The land rises slightly toward the west, while toward the east it gradually though imperceptibly declines. The streets are broad, and laid out at right angles with the railroad. The Denver Pacific railroad connects it with Denver, Colorado, 106 m. distant. Fort D. A. Russell is situated $2\frac{1}{2}$ m. N. W. of Cheyenne, and Fort Russell depot about half way between them. The depot is used for storing and distributing the government supplies for Forts Laramie and Fetterman on the North Platte and the Indian agencies N. of the city. About 10,000,000 lbs. of freight are annually sent to those points from the Union Pacific railroad at Cheyenne. The principal public building is the brick court house, with an iron jail and jailer's residence attached, which cost \$40,000. The two-story brick public school house cost \$12,000, and has an average attendance of 70 scholars. There are about 60 business houses, representing the ordinary branches of trade. The principal manufactures are of saddles and moss agate jewelry, the stone being found in large quantities in the territory. The machine and repair shops of the Union Pacific railroad are extensive. The first national bank of Cheyenne has a capital of \$100,000. There are several hotels, a small theatre, two newspapers issuing daily and weekly editions, and Congregational, Episcopal, Methodist, Presbyterian, and Roman Catholic churches.—Cheyenne was settled in the summer of 1867, when the Union Pacific railroad first reached the point. At one period there were 6,000 inhabitants in the place and vicinity, but as the road was extended west the floating population migrated with it. In the fall of 1869 a considerable portion of the business part of the city was burned, involving a loss of \$500,000, but it was speedily rebuilt.

CHEYENNES, a nation of Indians, being with the Blackfeet the most westerly tribe connected with the great Algonquin family. They

were formerly settled on the river Chayenne or Cayenne, a branch of the Red river of the North, from which they were driven by the Sioux. They then retreated beyond the Missouri below the Warreconne, where their fortifications were long visible. Before the commencement of the present century they were driven west to the Cheyenne river near the Black Hills, and here they were found by Lewis and Clarke in 1803. Acquiring horses, they became prosperous and active, carrying their raids as far as New Mexico. In 1822 their numbers were estimated at 3,250. In 1825 Gen. Atkinson made the first treaty with them at the mouth of Teton river, establishing friendship and regulating trade, but fixing no limits. They were then at peace with the Sioux, and warring with the Pawnees, Kansas, and other tribes. Dissensions arose, and the nation separated, one part remaining with the Ogallala Sioux, and with them wresting Powder river and Tongue river valleys from the Absarokas or Crows; the other moving south to the Arkansas, where they joined the Arapahoes. In 1847 they were estimated at 5,300. By the treaty of Fort Laramie in 1851 the northern Cheyennes agreed to allow roads to be run through their territory, and arrangements were also made with the southern band. Other treaties followed, often hastily made and imperfectly understood by the Indians, to whom they were explained through a Sioux interpreter, and never fully carried out by the United States government. The multiplicity of treaties and constant change of plans excited distrust in the minds of the Indians and led to many troubles. The failure to carry out the treaty of 1861 caused a bad feeling, and hostilities were begun by the attempt of some United States troops to disarm a southern Cheyenne party in consequence of a vague complaint that animals had been stolen. The Cheyennes were for the first time arrayed against the whites, but negotiations were on foot when Col. Chivington of Colorado, Nov. 29, 1864, attacked the Sand Creek village and massacred about 100 Cheyennes, men, women, and children. The war that followed is said to have cost the government \$30,000,000, and some accounts say \$40,000,000. Since that time there has been constant trouble. Treaties were made in 1865 and 1867, each giving different limits. In 1865 the southern band, except a part known as the Dog Soldiers, agreed to go on a reservation. In 1867 Gen. Hancock burned the village of these last on Pawnee fork, and another war began, in which Gen. Custer defeated them at Washita, killing Black Kettle and 37 others, two thirds women and children. This war cost the lives of 300 soldiers and settlers. The northern band continued peaceable, although urged by the Sioux to join them against the whites in 1865. In fact these Cheyennes submitted to insults hard for an Indian to bear, and gave warning to the troops. They renewed treaties of peace in 1866 and 1868. The

Cheyennes are now (1873) in three bodies in all cases mixed with Arapahoes, on Milk river, Montana, on the North fork of the Canadian, and a small band apart.—In person the Cheyennes are a fine race, exceeding in stature all the tribes of the plains except the Osages. They are generally rich in horses and are great horse dealers. The attempts to educate them have not met with much success, the school report of 1871 showing only eight pupils, although the tribe must number 3,500 souls. Their language is extremely difficult to learn.

CHEYNE, George, a British physician, born in Scotland in 1671, died at Bath in 1743. He was intended for the church, but devoted himself to medicine, and gained a high reputation by his writings, of which he published a great number. His most popular work was a treatise on the "English Malady," that is, on spleen, vapors, hysterics, and hypochondriacal diseases in general, with a minute account of his own case (London, 1733).

CHEYNELL, Francis, an English clergyman, born in Oxford in 1608, died at Preston, Sussex, in 1665. He entered Oxford university in 1623, and at first took orders in the church of England, but in 1640 sided with the parliament, and in 1643 was made one of the assembly of divines. In 1646 he was one of the delegation to convert the university of Oxford to the parliamentary cause, and in 1648 took forcible possession of the Lady Margaret professorship of theology in that university, and also of the presidency of St. John's. But, unable to retain them, he retired to the living of Petworth, where he remained until the restoration. Cheynell had previously published a work entitled "The Rise, Growth, and Dangers of Socinianism," in which he had violently accused Chillingworth, Archbishop Laud, and others, of Socinian tendencies. After the death of Chillingworth he published a book entitled "*Chillingworthi Novissima; or Sickness, Heresy, Death, and Burial of William Chillingworth*" (1644).

CHÉZY. I. Antoine Léonard de, a French orientalist, born at Neuilly, Jan. 15, 1773, died in Paris, Sept. 3, 1832. In 1798 he was appointed a member of the learned commission who were to accompany Bonaparte to Egypt, but was prevented from continuing in the expedition by illness, and the following year he was attached to the cabinet of oriental MSS. in the national library. In 1815 a chair of Sanskrit was created for him at the collège de France, and in 1816 he became a member of the academy of inscriptions. His most important works are: *Medjnoun et Leila*, translated from the Persian of Jami; *Yadjanadatta Badha*, an episode translated from the *Ramayana*; and *La reconnaissance de Sakountala*, a drama of Kalidasa. This last publication, giving for the first time the text with an elegant translation, was printed at the expense of the Asiatic society of Paris. His papers in the *Journal des Savants*, the *Journal Asiatique*,

and the *Mémoires* of the academy of inscriptions are also important. Among the manuscripts which he left were a *Chrestomathie persane*, a *Chrestomathie sanscrite*, a *Grammaire sanscrite*, and a *Vocabulaire sanscrit, pracrit et français*. **II. Wilhelmine Christiane von**, a German authoress, wife of the preceding, born in Berlin, Jan. 26, 1783, died Jan. 28, 1856. She was a granddaughter of Anna Luise Karsch, and a daughter of Karoline Luise von Klenke, both authoresses. In 1799 she was divorced from her first husband, and in 1802 found an asylum in the house of Mme. de Genlis in Paris, and gradually secured a competency as a writer. She was married to M. de Chézy in 1805, and in 1810 a voluntary separation took place, after which she went to Germany, where she found an influential friend in the prince of Dalberg, and where in 1813 she displayed great zeal for the relief of wounded soldiers. The latter part of her life, during which she became blind, was spent chiefly in Switzerland. She wrote the libretto of Weber's opera *Euryanthe*, many poems and novels, besides works descriptive of French society, and a biography of her mother, which she published under the name Helmina. Bertha Bornträger has published her memoirs under the title *Unvergessenes* (2 vols., Leipsic, 1858). **III. Wilhelm**, son of the preceding, born in Heidelberg, March 21, 1806, died in Vienna, March 13, 1865. He studied jurisprudence at Munich, but devoted himself to journalism and literature, and wrote many novels, besides *Erinnerungen* (2 vols., Schaffhausen, 1863-'4).—A younger brother of Wilhelm, Max, a painter, died in Heidelberg in 1846.

CHIAPAS, the southernmost state of the Mexican republic, bounded N. W. by Vera Cruz, N. by Tabasco, N. E. by Yucatan, E. and S. E. by Guatemala, S. W. by the Pacific ocean, and W. by Oajaca; area, about 17,000 sq. m.; pop. about 200,000, the greater part Indians and mestizos. It is traversed by the cordillera of the Sierra Madre, and watered by several rivers, chief among which are the Chiapas or Tabasco, rising in the mountains of Cuchumatanes in Central America, and flowing N. W. through the state and N. E. through Tabasco to the gulf of Mexico; the Usumasinta, which also rises in Central America, and flows into the gulf of Mexico by three mouths; and the Teapa. These are navigable to an inconsiderable extent. The lake of Chiapas, or more correctly Tepancuapan, in the southern part of the state, is 18 m. long and 3 m. wide, and abounds in crabs; and the Lago de los Istotes, in the same region, affords a plentiful supply of excellent fish, and is by some supposed to be the source of the Usumasinta. There are several other lakes of smaller dimensions. The ounce, puma, wild cat, a species of deer, the flying squirrel, wild hog, porcupine, ant-eater, armadillo, two species of monkey, the otter, and the black bear are common in Chiapas. Among the insects may be mentioned the tarantula, centipede, scorpion, and a few others almost equally

venomous. Among the birds are black and gray eagles, owls, peacocks, mocking-birds, woodpeckers, carpenter birds, and a great variety of small song birds. Timber suitable for all purposes is abundant; as are also annatto, fustic, logwood, dragon's blood, and other dyewoods. Cotton grows well, and tobacco, vanilla, pepper, ginger, aniseed, coffee, tea, and India rubber are produced. Jalap, sarsaparilla, colpachi (possessing properties analogous to those of quinine), and other medicinal products are found in large quantities. Indigo and cochineal are no longer produced. The manufactures are limited to the weaving of some very coarse cotton and woollen cloths, and to the distillation of *aguardiente*, or brandy, from bran, which spirit, being exempt from excise duties, is extensively consumed, especially by the indigenous inhabitants. This state is remarkable for numerous ruins of ancient cities and monuments, those of Palenque being the most noteworthy. (See **PALENQUE**.) Two stones in the shape of a tongue, about a yard long and two thirds of a yard in width, one of which has an inscription, are still standing, and are objects of adoration to the Indians. There is hardly any commerce, and there is almost an entire lack of passable roads. Capital, San Cristóbal.

CHIARAMONTE, a town of Sicily, in the province and 30 m. W. of Syracuse; pop. about 7,200. It stands on a spur of the mountain range extending between Castrogiovanni and Noto, and the former Capuchin convent commands one of the finest views in Sicily. The town has a well preserved feudal castle. The vicinity produces good wine.

CHIARI, a town of N. Italy, in the province and 15 m. W. of Brescia, near the left bank of the Oglio; pop. about 10,000. It has a handsome collegiate church and a public library, and considerable trade, especially in silk. It is surrounded by an ancient ruined wall, and many Roman remains are found.

CHIAROSCURO, an Italian word, sometimes rendered in English by the term "clear-obscure," which is used in painting to designate the distribution of the lights and shadows of a picture in such a manner that the objects may be naturally and effectively relieved from one another. It comprehends all the lights and darks of a picture, and particularly refers to their arrangement in masses on opposite sides. Correggio, Leonardo da Vinci, Giorgione, and particularly Rembrandt, were the chief masters of the art of *chiaroscuro*.

CHIAVARI, a town of Italy, in the province of Genoa, situated on the gulf and 20 m. S. E. of Genoa, at the mouth of the river Sterla, and on the Genoa and Sarzana railway; pop. about 10,000. It has narrow streets, open Gothic arcades, substantial houses of remarkable architecture, picturesque towers, and handsome churches. It contains a Franciscan convent, a hospital, an ecclesiastical seminary, a public library, and agricultural and artistic

associations. There are manufactures of lace, twist, and cabinet ware, and anchovy fisheries; and in the vicinity are good quarries of marble and slate.

CHIAVENNA (anc. *Clavenna*), a town of N. Italy, in the province and 20 m. W. N. W. of Sondrio, on the Maira; pop. about 2,500. It is situated in the midst of vineyards at the foot of the Rhaetian Alps, is surrounded by walls, and well built. The baptistery of one of its churches is remarkable for some interesting antiquities and specimens of mosaic work executed in bones. A castle, a town hall, and a hospital are the other chief buildings. The town derives its importance from its situation on the Splügen road, the great thoroughfare of trade between Switzerland and Italy, with both which countries it has an active commerce. It manufactures paper, beer, for which the town is noted, wine, amianthus cloth, pottery, and silk, the last being the staple.

CHICACOLE. See **CICACOLE**.

CHICAGO, the principal city of Illinois, capital of Cook county, the commercial metropolis of the northwest, and the fifth in population of the cities of the United States. It is situated on the W. shore of Lake Michigan, 18 m. N. of the extreme S. point of the lake, at the mouth of the Chicago river, 715 m. in a direct line W. by N. of New York, 590 m. N. W. of Washington, D. C., and 260 m. N. N. E. of St. Louis. Dearborn observatory, $3\frac{1}{2}$ m. S. and $\frac{3}{4}$ m. E. from the court house, is in lat. $41^{\circ} 50' 1''$ N., lon. $10^{\circ} 33' 40'' 8''$ W. from Washington. The site of the business portion is 592 ft. above sea level, and 14 ft. above the lake; it was originally much lower, but has been filled up from 3 to 9 ft. since 1856. It is an inclined plane, rising toward the west to the height of 28 ft., giving slow but sufficient drainage. The city stands on the dividing ridge between the basins of the Mississippi and St. Lawrence, and is surrounded by a prairie stretching several hundred miles S. W. and N. Within the city limits the W. shore of the lake extends nearly N. and S. One eighth of a mile N. of the court house a bayou, called the Chicago river, extends westward about five eighths of a mile, then divides into the North and South branches, which run nearly parallel with the lake shore about two miles in each direction. The South branch turns S. W. and then W. The river and its branches, with numerous slips, afford a water frontage of 38 m., of which 24 are improved, without including the lake front, on which an outer harbor is now (1873) in process of construction. Connected with the South branch is the terminus of the Illinois and Michigan canal, which extends to the Illinois river at La Salle. Formerly this connection was by means of a lock; but recent improvements have effected a continuous flow of water from the lake through the river into the canal. The city extends N. and S. along the lake about 8 m., and westerly from the lake about 5 m., embracing an area of about

35 sq. m. The main river and its branches divide the city into three natural parts, legally known as the North, South, and West divisions, which are connected by 33 bridges, and by two stone tunnels under the river bed. The South division embraces the territory S. of the main river and E. of the South branch, 5,363 acres; the North division comprises 2,533 acres N. of the river and E. of the North branch; while that portion of the city W. of the two branches, comprising 15,104 acres, extending from the N. to the S. extremity of the city, constitutes the West division. Great improvements have recently been made by dredging the river and constructing docks, wharves, and slips for the accommodation of vessels. The harbor, at the mouth of the river, is commodious, but has required frequent dredging and several extensions of the north pier to keep out accumulations of sand brought down by a N. E. to S. W. lake current, which have made fully 100 acres of new land on the N. side of the pier. Extending E. into the lake, on the N. side of the river, is a pier about 3,000 ft. long, at the extremity of which is a lighthouse. There is also a pier extending into the lake on the S. side of the river. Along the shore of the lake, S. of the river, extends a magnificent line of breakwater more than two miles long, constructed by the Illinois Central railroad company. The inside line of the works S. of Randolph street, for about a mile, was originally about 400 ft. from the shore; but most of that space has since been filled in, and the great union depot was built on a portion of the space thus reclaimed. Other great harbor improvements, to afford increased facilities for commerce, are now (1873) in progress. The improvement of the North Chicago dock company, begun in 1867, comprises a breakwater 500 ft. long, extending N. from the north pier. From the N. extremity of this breakwater another will run W. 1,500 ft. to the shore. The space thus closed will be devoted to commodious ship channels and docks. By means of an appropriation by congress the construction of a breakwater was begun in 1870, extending from the south pier 900 ft. E. into the lake, as far as the north pier, leaving a passage of 500 ft. between the two piers for entrance to the harbor. From the E. extremity of this breakwater another line 4,000 ft. long extends S., connecting with still another line running 3,400 ft. W. to the breakwater of the Illinois Central railroad. The basin thus enclosed comprises 275 acres, the entrance to which will be by an opening 600 ft. wide in the N. side.—The first census of Chicago was taken in 1837, when the city contained 4,170 inhabitants. The population, as reported by the federal census, has been: in 1840, 4,853; 1850, 29,963; 1860, 112,172; 1870, 298,977. Of the total population in 1870, 154,420 were of native and 144,557 of foreign birth; 295,281 were white and 3,696 colored. Of the foreigners, 52,318 were born in Ger-

many, 39,988 in Ireland, 10,027 in England, 4,197 in Scotland, 565 in Wales, 6,374 in Norway, 6,154 in Sweden, 1,243 in Denmark, 1,226 in Switzerland, 1,418 in France, and 9,648 in British America. There were 59,497 families, with an average of 5.03 persons to each, and 44,620 dwellings, with an average of 6.7 persons to each. The number of persons engaged in all classes of occupations was 112,960, of whom 533 were engaged in agriculture, 42,063 in personal and professional services, 29,806 in trade and transportation, and 40,558 in manufactures and mechanical and mining industries. According to a local estimate, the population was 334,270 in 1871, and 364,377 in 1872. —The climate of Chicago is highly favorable to comfort and health. The prevailing wind for the year, and especially during the summer, is S. W. The mean temperature for the eleven

months ending with September, 1872, was 46.7°, and the total rainfall 33.71 inches. The death rate per thousand inhabitants in 1872 was 27.6, while that of New York was 32.64, Philadelphia 25.34, Boston 30.89, Cincinnati 20.3, New Orleans 30.6, and San Francisco 16.9. The rate for Chicago, however, was higher than in any preceding year except 1866, when it was 32.22. It was 24.53 in 1870, and 21.46 in 1871.—The city is regularly laid out, with streets generally 80 ft. wide, and many of them from 3 to 7 m. in length, crossing each other at right angles. The principal thoroughfares extend N. and S. In 1872 there were 534 m. of streets, of which 94 were improved; 72 m. were paved with wooden blocks, 5 with cinders, 7 with gravel, 2 with stone, and 6 m. were macadamized. The streets are well lighted with gas and supplied with 161 m. of



Chicago before the Fire.

sewers. Chicago was formerly noted as being a city of wooden buildings and very low site. About 60 brick structures were erected previous to 1852. The bricks were made from excavations in the river and slips; 25,000,000 were used in 1854, and 50,000,000 in 1856. About the same time a beautiful stone was introduced from Athens, 20 m. distant, on the canal, since called Athens marble. It was extensively used, being nearly white, soft when cut, but hardening by exposure. In the great fire of 1871 this marble crumbled before the fury of the flames, and since then many of the business structures are built of less beautiful but more durable sandstone. Iron is now much used, and the fire limits include all the more settled portions of the city, within which no wooden buildings may be erected. After the filling-in process was undertaken, the principal buildings were raised to

the new grade, whole blocks being lifted up at once by numerous jackscrews, and kept to the required height by solid masonry laid while the buildings were in mid air above the workmen. Before the fire, a strip of land along the lake shore, from a quarter to three eighths of a mile wide and 11 m. long, embraced the finest residences of the city and the suburbs, Lakeview and Hyde Park. Nearly the whole of this section was covered with costly residences and grounds. Michigan and Wabash avenues were especially devoted to the homes of the wealthy. The business portion was in the South division, and extended from the river S. to Harrison street, embracing an area of about three fourths of a square mile. Here were nearly all the banks, the principal hotels and theatres, the leading wholesale establishments in every branch of trade, and many large manufactories, chiefly of clothing and

boots and shoes. Along the river and its branches were extensive lumber yards, with immense quantities of lumber, lath, and shingles; docks covered with coal and wood; extensive depots, grain elevators, and flouring mills; toward the north were distilleries, slaughter houses, and ship yards, and toward the south numerous packing houses. For a distance of about a mile and a half S. from the harbor were numerous railroad tracks for the accommodation of three important lines, centering in the great central depot at the foot of Lake street. W. of the junction of the two branches of the river were extensive founderies and machine shops. The principal buildings of the city having been destroyed by the fire, their renewal is now (1873) in progress. The custom house and post office will cost about \$3,500,000, and the new court house about \$2,000,000, both exclusive of the ground.—Chicago has a magnificent system of public parks, authorized in 1869, and laid out and partially improved previous to the fire, after which the work proceeded more slowly. There are six parks, aggregating nearly 1,900 acres, which are connected by a cordon of boulevards 250 ft. wide, extending around the three land sides of the city, with a drive on the lake shore. These give 33 m. of straightforward driving, besides the roadways around the park. Within the northern limits of the city is Lincoln park, containing 230 acres, with a broad front upon the lake. From the N. end of this park a boulevard $3\frac{1}{2}$ m. long extends W. to Humboldt park, which contains $193\frac{1}{2}$ acres, lying $1\frac{1}{2}$ m. N. and $3\frac{1}{2}$ m. W. from the court house. About 2 m. S. of Humboldt park, connected by a similar boulevard, is Central park, an irregular tract of land nearly a mile long from N. to S., and containing 171 acres, the middle line of which lies on Madison street, $4\frac{1}{2}$ m. from the court house. From this park the Douglas boulevard runs S. three fourths of a mile and E. seven eighths of a mile to Douglas park, which contains 171 acres. From this another boulevard runs S. $4\frac{1}{2}$ m., thence E. $4\frac{1}{2}$ m., to the northern of two parks in the South division. The South park system comprises 1,055 acres. The Northern or Western park contains 372 acres, lying between 51st and 60th streets. From the S. end of this park an avenue of great breadth extends eastward a mile to the E. division of another park embracing 593 acres, with a frontage of 1.6 m. on Lake Michigan. The South park system embraces about 14 m. of interior drives and 30 m. of walks. The scheme comprehends the extension of a pier into the lake about 1,100 ft. to protect a harbor on the south which will connect it with a series of meandering lakes in the interior. The parks of the South division are outside the city limits, in the towns of Hyde Park and Lake. The three parks near the W. limits of the city are supplied with water from artesian wells. Besides those included in this system, there are several smaller parks.—Chicago has water communica-

tion with a vast area. The lakes alone have some 3,000 m. of coast line. Steamers and vessels of the largest class trade with all ports on Lake Superior, bringing in copper and iron ores from the rapidly developing mines of that region. The Welland canal, between Lakes Erie and Ontario, admits vessels from Lake Michigan to Montreal, where they connect with steamer lines to Europe. Other canals give communication with New York and the interior of New England. It is also proposed to construct a canal for vessels of 1,000 tons burden from the head of Georgian bay to Toronto, which would materially facilitate the lake commerce of Chicago. In the summer of 1856 the Dean Richmond was loaded with wheat at Chicago, which she discharged at the docks in Liverpool; and several other vessels have since made direct connection with European ports; but this operation was seldom profitable, owing to the great difference between the requirements of fresh and salt water navigation. Transfer at Montreal to ocean-built vessels is found to be much cheaper; and the long cherished idea of European traffic without transfer is now abandoned. The Illinois and Michigan canal connects Chicago with La Salle, at the head of navigation on the Illinois river, which falls into the Mississippi. Work on this canal was commenced July 4, 1836, and finished in 1848, after a suspension of two years due to financial embarrassments. It is 96 m. long, with 15 locks; the highest level was 12 ft. above the lake. During 1866-'70 the canal was deepened by the city of Chicago, at a cost of \$3,251,621; the highest 26 m. being cut down to $8\frac{1}{2}$ ft. below the ordinary water level of Lake Michigan. This gives improved navigation, and also carries off the sewage of the city toward the Illinois river at the rate of a mile an hour, and draws with it enough water from the lake to keep the current clean. The canal is usually navigable from the middle of April to the latter part of November.—The first line of railroad (toward Galena) was commenced in 1847. In 1850 there were 42 m. of connecting line. In 1852 the city was connected with the east by the Michigan Southern in February, and the Michigan Central in May. It now has railroad communication with all parts of the continent by four trunk lines to the east, six to the west, bridging the Mississippi and connecting with the Pacific states, two southward to the gulf of Mexico and the southwestern states, and two northward to the Lake Superior region. In addition to these, with numerous branch lines and connections, a dozen other roads are now seeking admission to the city. More than 10,000 m. of railroad are directly tributary to Chicago, with annual gross receipts of nearly \$100,000,000, and annual profits of \$40,000,000; while 350 trains enter and leave daily, giving 700 arrivals and departures. The principal lines entering the city in 1873 were as follows: the Chicago and Northwestern; the Illinois Central; the Chicago, Rock Island, and

Pacific; the Chicago, Burlington, and Quincy; the Chicago and Alton; the Michigan Central; the Lake Shore and Michigan Southern; the Pittsburgh, Fort Wayne, and Chicago; the Pittsburgh, Cincinnati, and St. Louis; and the Chicago, Danville, and Vincennes. The railroad depots were formerly much scattered; but the policy of reconstruction leans toward the concentration of the railroad business into three grand union depots—one on the lake shore, one on the south side near the river, and the third in the West or North division, with a circular railroad on the outskirts, connecting all the lines that enter the city. Ample facilities for communication between different parts of the city are afforded by three lines of street railroads in the principal thoroughfares, and numerous lines of omnibuses. Until recently intercourse between the three divisions of the city was effected only by 33 bridges, which span the river at intervals of two squares, and swing on central pivots to admit the passage of vessels. These bridges, however, were a serious impediment to navigation as well as to vehicles and pedestrians. To obviate this inconvenience, a tunnel was constructed in 1868 under the South branch at Washington street, by which an uninterrupted communication was established between the South and West divisions. It is 1,608 ft. long, with a descent of 26 ft., has a double roadway for vehicles and a separate passage for pedestrians, and cost about \$400,000. In 1870 another similar tunnel, with a total length of 1,890 ft., including approaches, was constructed under the main river on the line of La Salle street, connecting the North and South divisions. Its cost was \$549,000.—Chicago is

the great commercial centre of the northwest, and in commercial importance ranks next to New York among the cities of the United States. Formerly there was but half a league of portage for canoes from Chicago river to Illinois river, which is tributary to the Mississippi; and at high water the Indians passed from one to the other without portage. This, and the fact that Chicago river was then the only good harbor near the head of lake navigation, suggested it as the terminus of a canal to connect the two great watercourses. Its commercial importance was thus established, and grew rapidly with the development of the country westward. The mercantile trade of the city is very important, as it supplies most of the region from which produce is received. In 1852 the commerce was estimated at \$20,000,000; in 1856 at \$85,000,000; in 1860 at \$97,067,617; in 1870 at \$400,000,000; in 1872 at \$450,000,000. The following were the leading items for the 12 months succeeding the fire, counting only the cost at first sale: breadstuffs, \$49,321,000; live stock, \$70,546,000; provisions received, \$9,455,000; wool and hides, \$14,818,000; tea and tobacco, \$16,526,000; lumber, &c., \$13,166,000; other produce, \$13,125,000; groceries, \$59,000,000; dry goods, \$40,000,000; boots and shoes, \$10,500,000; hardware, &c., \$9,500,000; clothing, hats, &c., \$6,000,000; jewelry, \$5,750,000; paper, &c., \$5,000,000; drugs, &c., \$5,000,000; millinery, \$4,500,000; books and newspapers, \$3,500,000; crockery, \$3,100,000; music and musical instruments, \$2,250,000; other sales, \$104,000,000. The leading articles of commerce are exhibited in the following statement of the aggregate receipts and shipments for two years:

ARTICLES.	1871.		1872.	
	Receipts.	Shipments.	Receipts.	Shipments.
Beef, bbls.	53,250	89,451	14,512	89,911
Butter, lbs.	13,231,452	11,049,867	14,574,777	11,497,537
Coal, tons.	1,081,472	96,838	1,895,024	177,687
Grain and flour reduced to bushels.	83,518,202	71,800,789	88,426,842	89,364,224
Hides, lbs.	25,026,084	22,462,864	32,387,995	28,950,292
Lard, lbs.	17,662,798	61,029,853	19,911,797	86,040,755
Lead, lbs.	18,845,101	5,994,751	20,235,635	10,842,717
Liquors and highwines, bbls.	120,969	171,031	163,991	169,564
Lumber, feet.	1,089,323,375	541,222,543	1,188,650,280	417,827,375
Pork, bbls.	68,949	149,724	121,023	205,604
Provisions and cut meats, lbs.	30,150,899	163,113,891	48,256,615	238,727,484
Salt, bbls.	703,717	450,138	606,673	513,850
Seeds, lbs.	20,234,146	14,213,989	44,755,412	22,358,542
Shingles, number.	647,595,000	558,355,350	610,824,420	486,827,375
Wool, lbs.	27,026,621	24,351,524	28,181,509	27,720,089

Chicago is a port of entry, and has an extensive commerce with Canada. The total value of domestic produce exported to Canada by lake in 1872 was \$5,251,539. By the act of congress of 1870 merchandise from foreign countries may be shipped direct to Chicago by being transported in bond from the port of first entry. This enables direct shipments to be made between Chicago and foreign countries, the transfer between Chicago and the seaports of the United States being made in

bonded cars. As early as 1854 it was announced that Chicago was the greatest primary grain depot in the world, collecting more grain from the producers than even the Russian ports. Since then the city has become also the greatest grain market in the world, her produce forming the basis for speculation, as stocks and gold do in New York. The following tables show the growth and extent of the trade, flour being reduced to its equivalent in wheat in the totals:

RECEIPTS OF BREADSTUFFS.

	1855.	1860.	1865.	1870.	1872.
Wheat, bushels.....	7,535,097	14,927,083	9,266,410	17,394,409	12,724,141
Corn, ".....	8,532,377	15,862,394	25,952,201	20,189,775	47,366,087
Oats, ".....	2,947,188	2,198,889	11,659,080	10,472,078	15,061,715
Rye, ".....	68,166	318,976	1,194,834	1,093,493	1,129,036
Barley, ".....	201,895	617,619	1,774,189	8,335,653	5,251,750
Flour, barrels.....	240,666	713,348	1,184,100	1,766,037	1,532,014
Total, bushels.....	20,367,702	37,285,027	54,950,114	60,432,574	88,426,842

SHIPMENTS OF BREADSTUFFS.

	1855.	1860.	1865.	1870.	1872.
Wheat, bushels.....	6,298,155	12,402,197	7,614,851	16,492,585	12,160,046
Corn, ".....	7,517,625	13,700,113	25,437,241	17,777,377	47,013,552
Oats, ".....	1,188,538	1,091,693	11,142,140	8,507,735	12,255,577
Rye, ".....	19,326	156,642	999,239	913,629	776,805
Barley, ".....	92,011	267,449	607,484	2,584,692	5,032,308
Flour, barrels.....	163,419	698,182	1,293,428	1,705,977	1,361,328
Total, bushels.....	16,632,750	31,108,750	52,265,181	54,745,903	83,864,224

The grain is received and shipped in bulk. It is lifted into elevators from railroad cars by buckets running on an endless chain, and operated by powerful steam machinery, and emptied through spouts into the holds of vessels. In 1873 there were 15 elevator warehouses, with an aggregate storing capacity of 12,800,000 bushels, in addition to several smaller storehouses. The capacity of the largest is 1,500,000 bushels; of the smallest, 200,000. Most of these elevators can each re-

ceive and ship 100,000 bushels per day. The business is supervised, and the grain graded, by inspectors appointed by the state, and an accurate record of receipts and shipments is kept by a state registrar. Of the total receipts in 1872, 8,017,865 bushels came by the Illinois and Michigan canal, 173,971 by lake, and the remainder, nine tenths of the whole, by railroad. The various lines by which the grain is sent to market are indicated in the following statement of shipments for 1872:

SHIPPED BY	Flour, barrels.	Wheat, bushels.	Corn, bushels.	Oats, bushels.	Barley, bushels.
Lake—					
To Buffalo.....	140,344	5,511,143	31,989,979	4,502,729	2,235,059
To Oswego.....	19,338	287,292	1,068,456	48,080	16,185
To Erie.....	.....	300,390	154,587	645,012	.....
To Ogdensburg.....	6,795	2,020	496,397	56,214	.....
To other American ports.....	55,863	209,547	2,670,091	1,003,328	76,779
To Montreal.....	627	256,814	449,585	.....	.....
To Kingston.....	.....	1,483,329	2,162,477	.....	.....
To other Canadian ports.....	.....	551,385	2,597,936	115,411	2,500
Total by Lake.....	223,457	8,831,870	41,589,508	6,370,784	2,330,523
Illinois and Michigan Canal.....	1,201	206,010	.....	7,064	.....
Chicago and Northwestern Railway.....	21,262	119,675	27,928	18,962	45,249
Illinois Central Railroad.....	39,528	111,144	.....	1,240	68,976
Chicago, Rock Island, and Pacific Railroad.....	9,872	203,728	5,714	1,018	50,266
Chicago, Burlington, and Quincy Railroad.....	7,346	80,402	.....	.....	18,897
Chicago and Alton Railroad.....	14,552	157,877	.....	1,850	57,560
Michigan Central Railroad.....	131,850	834,660	2,066,722	2,953,791	558,515
Lake Shore and Michigan Southern Railway.....	132,249	423,921	1,971,132	1,646,272	597,184
Pittsburgh, Fort Wayne, and Chicago Railway.....	472,185	544,518	1,200,150	763,400	947,310
Pittsburgh, Cincinnati, and St. Louis Railway.....	236,634	560,711	150,398	459,856	354,038
Chicago, Danville, and Vincennes Railroad.....	21,142	85,530	2,000	1,300	8,440
Total shipments.....	1,361,328	12,160,046	47,013,552	12,255,537	5,032,308
In store Dec. 31, 1872.....	25,552	1,047,633	1,595,252	844,669	307,039
City consumption, or unaccounted for.....	864,772	807,001	1,870,920	2,700,032	439,332
Total.....	1,751,652	14,014,780	50,479,724	15,800,288	5,778,679

There were also shipped 1,429,076 bushels of rye, chiefly by railroad. In 1872, 563,617 bushels of wheat and 388,970 of corn were shipped direct to foreign countries, chiefly to Great Britain and Ireland, on through bills of lading.—The total number of vessels owned in the district of Chicago in 1872 was 654,

with an aggregate tonnage of 99,403. Among these were 268 schooners, 245 canal boats (including 17 propelled by steam), 54 tugs, 34 scows, 31 barks, 8 propellers, 7 barges, 6 brigs, and 1 steamer. The number of arrivals and clearances for a series of years has been:

ARRIVED.			CLEARED.	
YEARS.	Vessels.	Tonnage.	Vessels.	Tonnage.
1862.....	7,417	1,981,692	7,270	1,915,554
1863.....	8,678	2,172,611	8,457	2,161,221
1864.....	8,988	2,172,866	8,824	2,166,904
1865.....	10,112	2,106,559	10,067	2,092,276
1866.....	11,084	2,258,572	11,115	2,361,520
1867.....	12,280	2,588,527	12,140	2,512,676
1868.....	18,174	2,984,591	18,225	3,020,812
1869.....	18,730	3,123,400	18,872	3,149,946
1870.....	12,739	3,049,265	12,438	2,983,942
1871.....	12,390	3,096,101	12,812	3,082,235
1872.....	12,824	3,059,752	12,531	3,017,790

In 1872, 12,622 vessels in the coasting trade, of 3,001,538 tons, arrived, and 12,064 cleared; 152 foreign vessels, of 43,802 tons, arrived from and 150 cleared for foreign ports; 50 American vessels, of 14,412 tons, arrived from and 317 cleared for foreign ports.—As a market for live stock Chicago is the most important centre in the United States. The vast live stock trade is transacted at the union stock yards, situated near the S. limits of the city, and connected with all the railroad lines. They were opened Dec. 25, 1865, comprise 345 acres, of which 100 are in pens, and have 31 m. of drainage, 7 m. of streets and alleys, 3 m. of water troughs, 10 m. of feed troughs, 2,300 gates, and cost \$1,675,000. They have capacity for 21,000 cattle, 75,000 hogs, 22,000

sheep, and 200 horses. Water is supplied for the use of the yards from artesian wells. The foregoing tables exhibit the receipts and shipments of cattle and hogs for a series of years. The total value of the live stock received in 1872 was estimated by the board of trade at \$75,475,000, including cattle valued at \$41,000,000, hogs \$33,500,000, sheep \$950,000, and horses \$250,000. Since 1862-'3 Chicago has held the supremacy in extent of pork-packing, having in that year distanced Cincinnati in this respect. Of the total number (4,885,910) of hogs packed in the west in 1871-'2, 1,225,236 were packed in Chicago and 717,816 in Cincinnati. The growth of this industry in Chicago is shown in the following statement:

SEASON.	Number of Hogs Packed.	SEASON.	Number of Hogs Packed.
1851-'52.....	22,036	1862-'63.....	970,264
1852-'53.....	44,156	1863-'64.....	904,659
1853-'54.....	52,849	1864-'65.....	760,514
1854-'55.....	73,694	1865-'66.....	507,355
1855-'56.....	80,880	1866-'67.....	639,332
1856-'57.....	74,000	1867-'68.....	796,226
1857-'58.....	99,257	1868-'69.....	597,954
1858-'59.....	179,684	1869-'70.....	685,140
1859-'60.....	151,839	1870-'71.....	919,197
1860-'61.....	271,805	1871-'72.....	1,225,236
1861-'62.....	505,691	1872-'73.....	1,456,650

The details of the packing for two seasons are:

	1871-'72.	1870-'71.
Packed in October.....	10,350	48,917
Packed Nov. 1 to March 1:		
Live.....	1,107,885	750,040
Dressed.....	107,001	120,240
Total for winter.....	1,214,886	870,280
Average net weight, lbs.....	23,254	22,524
Yield of lard, average lbs. per hog.....	4,377	8,718
Total tierces of 300 lbs.....	167,592	114,972
Barrelled Pork:		
Mess, bbls.....	126,059	99,801
Prime mess, bbls.....	19,398	40,587
Extra prime, bbls.....	8,048	3,593
Total bbls.....	149,404	143,731
Middles:		
Short clear, lbs.....	24,928,980	12,559,866
Short rib, lbs.....	81,700,089	30,084,065
Long clear, lbs.....	18,302,005	6,809,332
Cumberland cut, lbs.....	6,235,424	5,278,349
Rough sides, lbs.....	1,730,603	4,114,516
Shoulders, lbs.....	81,827,752	21,962,831
Hams, lbs.....		
Bulk, green, lbs.....	27,702,599	18,500,007
Sweet pickled, tierces.....	25,475	31,870

The packing of 1872 was performed by 27 principal firms and a number of small houses. One firm alone packed 373,725 hogs in the four winter months. The work is very expeditious. The hogs are driven up an inclined plane to a pen in the upper part of the packing house. A chain or cord attached to a pulley in a sliding frame near the ceiling is slipped over one hind leg, the hog is jerked up, his throat cut, the body lowered into a long vat of boiling water, lifted out, scraped, disembowelled, and hung up to cool. When cooled the bodies are cut up into "meats" or pork, and salted, the irregular pieces being thrown into huge tanks, where they are steamed into lard. A

RECEIVED.

YEARS.	HOGS.			CATTLE.
	Live.	Dressed.	Total.	
1857.....	208,902	35,438	244,345	49,524
1858.....	416,225	124,261	540,486	140,584
1859.....	188,671	82,558	271,224	111,694
1860.....	285,149	107,715	392,864	117,101
1861.....	549,039	126,863	675,902	204,259
1862.....	1,110,971	237,919	1,348,890	209,655
1863.....	1,606,818	350,055	1,956,873	304,448
1864.....	1,285,871	289,457	1,575,328	328,840
1865.....	757,072	92,239	849,311	330,301
1866.....	938,233	353,093	1,291,326	384,251
1867.....	1,696,689	260,431	1,957,120	329,243
1868.....	1,706,592	281,923	1,988,515	323,514
1869.....	1,661,869	190,513	1,852,382	403,102
1870.....	1,698,158	260,214	1,958,372	532,964
1871.....	2,850,083	272,466	3,122,549	543,050
1872.....	3,252,623	235,905	3,488,528	684,975

SHIPPED.

YEARS.	HOGS.			CATTLE.
	Live.	Dressed.	Total.	
1857.....	110,070	13,498	123,568	25,502
1858.....	159,181	82,832	192,013	42,638
1859.....	87,254	22,992	110,246	37,584
1860.....	191,931	35,293	227,164	97,474
1861.....	216,982	72,112	289,094	124,145
1862.....	446,506	44,629	491,135	112,745
1863.....	752,151	110,089	862,190	201,066
1864.....	561,277	98,115	659,392	253,439
1865.....	575,511	69,084	644,545	301,637
1866.....	484,793	91,306	576,099	268,723
1867.....	760,547	156,091	916,638	216,982
1868.....	1,020,812	226,901	1,247,713	217,897
1869.....	1,086,305	199,650	1,285,955	294,717
1870.....	924,483	171,188	1,095,671	391,709
1871.....	1,162,286	169,473	1,331,759	401,927
1872.....	1,835,594	145,701	1,981,295	510,025

large proportion of the product is shipped to Europe during the winter months. Beef packing is also an important branch of trade, but there has been a decline in this industry in consequence of the increase in the number of cattle packed in the southwest where they are raised. The number of cattle packed in 1860 was 51,606; the maximum (92,459) was reached in 1865. Since that date the number has decreased, being 21,254 in 1871, and 16,080 in 1872. The following statement exhibits the details of this business for four years, the packing being done chiefly by four packers:

	1868-'9.	1869-'70.	1870-'1.	1871-'2.
Cattle packed.....	26,950	11,963	21,254	16,080
India and India mess made, tierces.....	9,183	2,849	6,442	6,502
Extra mess beef, made, tierces.....	7,258	4,120	5,351	4,296
Prime mess beef, made, tierces.....	12,638	4,465	11,040	5,902
Mess beef, made, tierces.	13,583	9,018	9,685	5,163

—The lumber trade of Chicago is a very prominent item of its commerce. The city takes a very large proportion of the produce of Michigan and Wisconsin, and distributes it by railroad and canal all over the northwest, much of it being manufactured in the city before shipment. The following are the statistics of this commerce for several years:

YEARS.	RECEIVED.		SHIPPED.	
	Lumber, feet.	Shingles, number.	Lumber, feet.	Shingles, number.
1852...	147,816,292	77,080,500	70,740,271	55,851,088
1853...	202,101,078	98,438,784	88,909,848	71,442,550
1854...	223,336,753	82,061,250	133,131,872	92,506,301
1855...	306,547,401	108,647,250	215,585,354	134,793,250
1856...	456,673,169	135,576,000	243,387,732	115,563,250
1857...	459,639,198	131,530,250	311,608,793	154,327,750
1858...	278,943,000	127,565,000	242,793,268	150,129,250
1859...	302,945,207	165,927,000	226,120,389	195,117,700
1860...	262,494,626	127,594,000	225,372,940	168,302,525
1861...	249,308,705	79,356,000	189,379,445	94,421,186
1862...	305,674,045	131,255,000	189,277,079	55,761,630
1863...	413,301,518	172,364,575	221,709,380	102,634,447
1864...	501,592,406	190,169,750	269,496,579	138,497,256
1865...	647,145,734	310,897,350	385,353,678	258,351,450
1866...	730,057,168	400,125,250	422,313,265	422,339,715
1867...	882,661,770	447,089,275	518,973,354	450,930,500
1868...	1,023,494,759	514,494,100	551,939,806	537,497,074
1869...	997,736,942	673,166,000	581,533,480	633,317,840
1870...	1,018,998,655	652,091,000	533,490,634	666,247,775
1871...	1,039,328,375	647,595,000	541,222,543	558,355,350
1872...	1,138,659,230	610,824,420	417,827,375	436,827,375

The lumber trade is transacted by a lumber exchange, while the transfer of other produce is chiefly effected by the board of trade. The stock of lumber on hand Jan. 1, for three years, has been:

KINDS.	1873.	1872.	1871.
Sawed pine lumber and timber, feet.....	321,943,232	233,871,527	295,124,252
Hewn pine timber, feet....	660,000	567,000	8,628,716
Shingles, number.....	40,301,000	70,970,000	22,702,000
Lath, pieces.....	27,751,520	17,550,340	33,082,564
Pickets, pieces.....	706,089	1,049,666	1,322,738
Cedar posts, number.....	107,309	129,710	155,985

—In 1850 the manufactures of Cook county, of which Chicago forms nearly all, were returned at \$2,562,583, on a capital of \$1,068,025, employing 2,031 hands. In 1860 the productions were worth \$13,555,671; capital, \$5,571,025; hands, 5,593. In 1870, and for the years succeeding the fire, the values of products of Chicago alone were as follows:

PRODUCTS.	1870.	Oct. 9, '71, to Oct. 9, '72.
Pork packing.....	\$13,000,000	\$18,650,000
Beef packing.....	1,000,000	750,000
Iron and steel.....	4,000,000	6,500,000
Founderies, &c.....	3,658,000	6,800,000
Flour, &c.....	2,380,334	1,620,000
Distilling and rectifying.....	6,068,221	8,200,000
Brewing.....	3,000,000	2,500,000
Furniture.....	1,277,888	1,400,000
Agricultural implements.....	2,003,000	1,950,000
Carriages and wagons.....	1,369,000	1,100,000
Printers' materials.....	250,000	250,000
Printing, &c.....	3,000,000	3,250,000
Boots and shoes.....	1,500,000	1,000,000
Clothing.....	1,000,000	700,000
Lumber and planing.....	9,700,000	14,600,000
Brick.....	750,000	4,100,000
Lime.....	290,000	500,000
Tanneries.....	2,230,000	2,500,000
Sundries.....	19,922,000	26,800,000
Total.....	\$76,543,000	\$103,470,000
Add buildings.....	12,000,000	44,100,000
Total.....	\$88,543,000	\$147,570,000

The manufactures of 1872 include 353,000,000 bricks, and \$6,500,000 worth of iron, Bessemer steel rails, sheet iron, and boiler plate. The iron manufacture employs 1,200 men in four establishments, which in 1872 used 100,000 tons of ore, mostly from Lake Superior, 300,000 tons of bituminous coal and coke, and 25,000 tons of charcoal iron, on an aggregate working capital of \$4,500,000. Chicago produced more Bessemer steel in 1872 than any state outside of Illinois, except Pennsylvania; and the iron industry promises to become much more important in the future. Prior to the great fire the manufacture of flour was extensively carried on. There were then 15 mills, which produced 732,479 barrels of flour in 1868, 543,285 in 1869, 443,976 in 1870, and 327,739 in 1871. In the last named year six of them were destroyed by fire, and the remainder produced 186,968 barrels of flour in 1872. The manufacture of highwines has increased from 3,744,000 gallons in 1860 to 7,082,364 in 1870, and 7,209,347 in 1872. There are also manufactures of cotton and watches. About 50,000 persons are employed in manufactures, and nearly one third of the commerce of the city is based upon the productions of these workers. The manufacturing business is yet in its infancy, except in agricultural implements, pork and meats, boots and shoes, and leather, for which the city is famous. Ship building is carried on to some extent. During the year ending June 30, 1872, six sailing vessels of 926 tons and two barges of 193 tons were built in Chicago. The banking business of Chicago is enormous. The first bank

was a branch of the second of the state of Illinois, established in Chicago in December, 1835; it suspended specie payments in 1837, and closed in 1841. The next was established in 1853. At the close of 1872 there were 21 national banks, with a total capital and surplus of \$11,044,885, and \$23,060,507 deposits. There were also 18 savings banks (some being connected with other banks), with \$12,013,000 deposits; 8 state-chartered commercial banks, with capital and surplus of \$2,926,000, and \$3,055,627 deposits; one foreign branch bank, and numerous private banks.—Chicago is divided into 20 wards. The government is vested in a mayor, chosen every two years, and a board of 40 aldermen, two from each ward, also elected for two years. The mayor has little power beyond the veto, and makes nominations to be confirmed or rejected by the council. The board of supervisors is a county organization, to which one member from each ward and two from each division of the city are elected. The board of fire and police commissioners consists of three members, elected by the people, and has full authority over the fire and police departments. The board of public works consists of three members, nominated by the mayor and confirmed by the council; they have control of the streets, public buildings (except schools), bridges, &c., with power to make assessments on property, subject to the approval of the council. The board of education comprises one member from each ward, appointed by the council; they have charge of school buildings, appointment of teachers, choice of text books, and general school regulations. Sanitary regulations are intrusted to a board of health and a sanitary superintendent. There are two boards of park commissioners. Besides the county courts, there are three police courts, one for each division. The United States circuit and district courts for the northern district of Illinois are also held here. The police force consists of a superintendent, 3 captains, 16 sergeants, and about 500 patrolmen. For police purposes the city is divided into 12 precincts. The total number of arrests during the year ending March 31, 1872, was 21,931; value of property reported stolen, \$64,449, of which \$40,187 was recovered; total amount of fines, \$123,475. The charges on arrest were: assault with a deadly weapon, 242; burglary, 160; drunk, 4,397; drunk and disorderly, 3,700; disorderly, 5,684; forgery, 26; highway robbery, 22; keeping disorderly house, 135; keeping gaming house, 63; keeping house of ill-fame, 302; larceny, 2,123; murder, 3; riot, 141; robbery, 157; vagrancy, 881. The nationalities of those arrested were: 8,167 Irish, 7,646 American (including 652 colored), and 3,379 German. The cost of the department during the year was \$498,247, of which \$229,652 was for salaries. The fire department comprises a force of 201 men, including officers, fire wardens, and the

fire alarm telegraph corps. The apparatus in use includes 16 steam fire engines with an attending hose cart to each, and 26,150 ft. of rubber and 9,100 ft. of leather hose. The apparatus used for elevating hose can be raised to the height of 84 ft. without contact with any building or other support. It is used for the purpose of elevating firemen with hose to the upper stories of high buildings, in order to throw a stream more effectively upon a fire, and to save life and property. The estimated value of property in use, including real estate, is \$639,050. During the year ending March 31, 1871, there were 489 fires and 44 false alarms. The total amount of loss was \$972,800; amount of insurance, \$745,000; total amount of insurance on property more or less injured by fire, \$1,246,224. These figures do not include the great fire, an account of which is given hereafter. In the preceding year there were 669 fires, with losses amounting to \$2,447,845; insurance, \$2,183,498; total amount of insurance on property injured by fire, \$4,416,690. There is a very efficient fire alarm and police telegraph system, established in 1864, and much improved since the fire, having in 1872 234 signal boxes in different parts of the city, each connected by electric wire with the police stations and engine houses. The expenses of the fire department for 1872 were \$512,520.—The system of water supply for Chicago has been called one of the wonders of the world. A nearly cylindrical brick tunnel, 62 inches high and 60 wide, extends two miles under the lake, lying 66 to 70 ft. below the lake surface. The water descends through a grated cylinder enclosed in an immense crib, on which a light-house is to be constructed. At the shore end it is pumped up an iron column 130 ft. high, inside a stone water tower, and thence flows to all parts of the city. The engines can pump 72,000,000 gallons daily, and the tunnel can deliver 57,000,000 gallons daily. The tunnel was commenced March 17, 1864, and finished Dec. 6, 1866. Water was first supplied to the city through it March 25, 1867; it is always pure, and the supply has never been interrupted except a few days by the great fire. The city is now (1873) constructing another tunnel 7 ft. in diameter to the same crib, to extend under the city, to give an independent supply to the southwestern quarter. An abundant water supply has recently been also developed in artesian wells, of which there are now about 40. The depth varies from 650 to 1,646 ft., the lowest reaching the sandstone. The flow averages about 200 gallons per minute, and no diminution is observed from sinking adjacent wells. The water is variously supposed to come from Rock river and from the region of the Mississippi; it is reasonably pure, containing 70 grains of solid matter per gallon, while lake water has 8 grains. It is chiefly objectionable because it contains 24 grains of sulphuric acid, while lake water has less than one third of a grain. In 1872 there

were 309 m. of supply pipes and 1,667 fire hydrants. The amount of water daily supplied in 1872 was 23,464,877 gallons, or 72.8 to each inhabitant. The total cost of the water works to Jan. 1, 1873, was about \$5,225,000. A site for the new water works, consisting of $3\frac{1}{2}$ acres of land, has been purchased in Ashland avenue, near 22d street. A tunnel 7 ft. in diameter and 4 m. in length will pass under the central portion of the city, connecting the old and the new works. It will be capable of conveying 100,000,000 gallons of water daily, and will afford a central supply of water for use in case of fire, independent of that furnished by the pumps and water mains.—The bonded debt of Chicago, Jan. 1, 1873, was \$13,546,000. The receipts into the treasury for the year ending April 1, 1872, amounted to \$12,936,581, and the expenditures to \$14,112,957. The chief items were:

	Receipts.	Expenditures.
Board of public works appropriation	\$269,969	\$983,529
Certificates of debt.....	252,768	88,935
Fire department.....	146,598	852,660
Interest fund.....	131,328	258,097
Lamp districts.....		169,140
Licenses.....	187,631	2,385
Police fund.....	228,402	490,685
River improvement fund.....	488,264	669,986
School tax fund.....	54,974	462,136
Sewerage fund.....	3,809,273	3,600,772
Sewerage tax fund.....	3,021,234	3,119,839
Special assessments.....	1,397,299	1,887,312
Taxes.....	2,209,958	
Tunnel fund.....	94,743	180,963
Water fund.....	655,960	774,836
Water tax fund.....	111,648	822,942

The total valuation of real and personal property in the city for the purposes of taxation, with the amount and rate of taxation and the bonded debt, has been as follows:

YEAR.	Total Valuation.	Rate of Taxation per ct.	Total Tax Levied.	Bonded Debt.
1841...	1,667,445	6-10	10,004	.....
1842...	1,530,213	6-10	9,181	.....
1843...	1,570,490	11-28	8,637	.....
1844...	2,861,041	6-10	17,166	.....
1845...	3,165,025	7-20	11,077	.....
1846...	4,521,659	7-20	18,525	.....
1847...	5,188,290	7-20	18,159	.....
1848...	6,800,440	7-20	22,051	.....
1849...	6,676,684	9-20	30,045	.....
1850...	7,222,999	7-20	23,250	.....
1851...	8,562,717	$\frac{3}{4}$	63,335	.....
1852...	10,463,414	$\frac{3}{4}$	76,962	\$126,035
1853...	16,841,531	$\frac{3}{4}$	135,662	189,670
1854...	24,392,239	9-10	199,031	248,666
1855...	26,992,593	7-10	205,932	328,000
1856...	31,736,084	11-10	396,558	435,000
1857...	36,335,281	$1\frac{1}{2}$	572,046	535,000
1858...	36,189,932	1 1-10	430,190	.....
1859...	36,553,830	1 3-10	513,614	1,885,000
1860...	37,053,512	9-10	373,050	2,336,000
1861...	36,352,830	1 2-10	550,968	2,362,000
1862...	37,189,545	1 4-10	564,038	2,025,000
1863...	42,667,324	2	853,346	3,422,500
1864...	48,732,752	2	974,655	3,544,500
1865...	64,709,177	2	1,294,183	3,701,000
1866...	85,953,250	2	1,719,065	4,369,000
1867...	195,026,544	1 3-10	2,518,472	4,757,500
1868...	230,247,000	1 4-10	3,228,458	6,484,500
1869...	266,024,880	$1\frac{1}{2}$	3,990,373	7,882,590
1870...	275,956,550	$1\frac{1}{2}$	4,139,798	11,362,726
1871...	259,746,470	1	2,897,464	14,108,000
1872...	284,197,430	.....	4,262,961	13,546,000

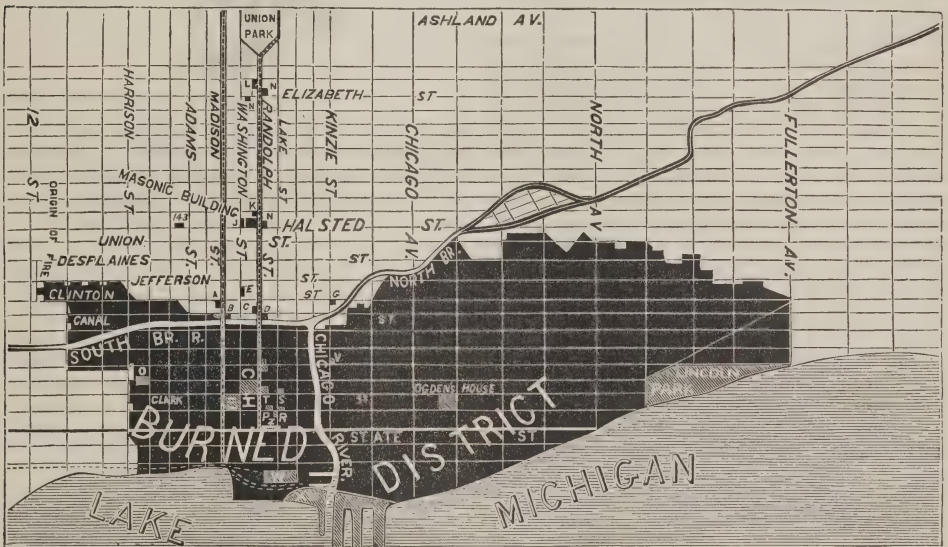
The actual value of property in 1871 was about \$620,000,000.—The public school system takes high rank for efficiency; it gives instruction to the children of citizens free of charge. The total number of schools in 1872 was 32, including 1 high, 1 normal, 19 grammar, and 11 primary schools. These occupied 45 buildings and 412 rooms. There were 476 teachers, of whom 445 were females. According to the school census of 1872, the school population, including those between 6 and 21 years of age, was 88,219. The whole number of different pupils enrolled was 38,035. The average number belonging to the high school was 512; normal, 63; grammar and primary schools, 23,964; total 24,539. The course of study in the high school is four years. Of the 476 teachers employed in 1872, 221 were graduates of the normal and high schools. German and music are extensively taught in the public schools, the number of pupils studying the former in 1872 being 4,533. The total amount expended for the support of schools was \$479,349, including \$359,588 for teachers' salaries. The total cost for each pupil, including 6 per cent. valuation upon school property, was \$15.97 on the number of pupils enrolled, \$24.75 on the average number belonging to the schools, and \$26.41 on the average daily attendance. The total income for school purposes amounted to \$395,289, including \$303,802 from school tax fund (at the rate of $2\frac{4}{100}$ mills per dollar), \$30,487 from state fund, and \$61,003 from rents and interest. The value of school buildings was \$1,071,100; land, \$1,194,452. There are also many private academies, and several schools sustained by the Catholics. The Baptists, Methodists, Presbyterians, Congregationalists, and Roman Catholics have flourishing colleges and institutes for training ministers, all moderately well endowed, but suffering heavily from the fire. The Baptist denomination is identified with the university of Chicago, founded by the efforts of and partially by gift from Stephen A. Douglas. Connected with it are a very efficient law institute and the Dearborn observatory, which contains a very fine equatorially mounted refracting telescope, of 23 feet focal length and 18 $\frac{1}{2}$ inches aperture, made by Alvan Clark and sons, and set up in 1864, then being the largest and best in the world. The city also contains six medical colleges, one of which is open to women. The academy of sciences, established in 1857, lost a valuable collection of 18,000 specimens by fire in 1866, and again lost all in 1871, though in a "fire-proof" building. It is now in a new building, and is slowly gathering a new museum and library. The Chicago historical society, established in 1856, lost in the fire 60,000 bound volumes and 150,000 pamphlets, besides files of newspapers, valuable MSS., fine paintings, and numerous war relics. It has not been revived, but its place is being taken by a public library, the nucleus of which was con-

tributed by English authors and publishers in 1872. It will occupy the custom house and post office of 1871, the walls of which were left standing. The Christian union has a library, reading room, gymnasium, &c., and evening classes in languages, art, and science; the total expense to each member being \$1 per year. The young men's Christian association, organized March 28, 1858, will probably soon erect a new building, to take the place of their magnificent Farwell hall, burned down in 1871. —The newspaper press of Chicago has wide circulation and influence. The first was the "Democrat," established in 1833 by John Wentworth, which in 1861 was merged in the "Tribune," established in June, 1847, originally whig, afterward republican, now free-trade independent. The "Evening Journal," protectionist republican, was established in 1844; the "Times," free-trade democratic, in 1854; the "Evening Post," free-trade republican, in 1865; the "Inter-Ocean," protectionist republican, in 1872, succeeding the "Republican;" the "Evening Mail," independent, in 1869; and the *Staats-Zeitung*, German, republican, in 1846. There are two other German dailies, several secular weeklies, four religious weeklies ("Advance," "Interior," "Northwestern Christian Advocate," and "Standard"), one scientific, three literary, and several medical monthlies. The total number of dailies, weeklies, and monthlies is about 80, not including mere advertising sheets, programmes, and circulars. —Since 1860 the city has been a prominent art centre. Several galleries and the academy of design were burned in 1871; the latter will be reestablished. Before the fire Chicago was liberally supplied with places of amusement. Of first-class theatres, McVicker's and Hooley's are rebuilt; Aiken's, the academy of music, and Myers's are new. The magnificent opera house, erected in 1864, and the museum, in 1863, had not been reproduced in 1872. The board of trade is an influential commercial body of nearly 1,400 members, organized in 1850. It meets daily in the chamber of commerce. Chicago had three taverns in 1830, and not less than four hotels in 1835; the oldest now existing is the Tremont, built in 1834. Since then the city has been noted for the extent of its hotel accommodations. Nine extensive hotels have been rebuilt since the fire, at a cost of more than \$8,000,000, which, with 12 or 15 smaller ones, more than restore the original accommodations for travellers. All are much superior in appearance and comfort to those destroyed, most of them containing fewer rooms and better furniture. —The following countries are represented by consuls in Chicago: Austria, Belgium, Denmark, France, Germany, Great Britain, Italy, the Netherlands, Sweden, and Switzerland. —Chicago, almost equally with Brooklyn, is entitled to be called a city of churches. The Methodists were the pioneers in worship. They were

represented there by the Rev. Jesse Walker; the first quarterly meeting was held in the autumn of 1833, and the first regular class was formed the following spring. The first Presbyterian church was organized June 26, 1833, with the Rev. Jeremiah Porter as pastor, 25 members from the garrison and 9 citizens. Other churches began as follows: Baptist, Oct. 19, 1833; Roman Catholic (built), 1833-'4; Episcopal, 1834; Unitarian, 1836; New Jerusalem, 1843; Jewish, 1847; Universalist, 1850; Congregational, 1851. The following were the structures the day before the fire; the congregations were widely scattered by the calamity, but most of the church edifices destroyed have since been rebuilt, and the membership is probably greater now than then: Baptist, 20 churches, 8 missions; Christian, 4 societies, 2 churches; Congregationalist, 13 churches, 2 missions; Episcopal, 15 churches, 4 missions; Evangelical, 17 churches; Independent, 1 church, 5 missions; Jewish, 5 synagogues; Lutheran, 6 churches, 1 mission; Methodist, 21 churches; Presbyterian, 19 churches, 8 missions; Roman Catholic, 25 churches, 12 convents and schools; New Jerusalem, 2 churches, 2 missions; Unitarian, 3 churches and one other society; Universalist, 3 churches and a fourth society; Friends, 2 societies; miscellaneous, 4 churches. Total, 156 structures, a large proportion of which were fine stone edifices, 36 Protestant missions or societies not owning buildings, and 12 Catholic convents or schools. Total attendance, 150,000; number of Sunday school scholars, 57,000; value of church property, with lands, \$10,350,000, or an average of \$69 to each attendant on church worship. —Long before the site of Chicago was visited by a white man, it was a favorite rendezvous for several Indian tribes in succession. The earliest recorded were the Tamaraos, the most powerful of many tribes of the Illini (whence the name Illinois). The word Chicago is Indian, probably corrupted from *Cheecaqua*, the name of a long line of chiefs, meaning "strong;" also applied to a wild onion that grew plentifully on the banks of the river. The first geographical notice occurs in a map dated Quebec, Canada, 1683, as "Fort Checagou." It was first visited by Marquette, a French Jesuit missionary, in 1673, who returned and camped near the site during the winter of 1674-'5. It was visited about the same time by Joliet, and subsequently by Hennepin and La Salle, and other French explorers. The first fort was probably built by the French, and abandoned when Canada was ceded to Great Britain. Fort Dearborn was built in 1804 by the United States government, on the south bank of the river, near its mouth. When the war with Great Britain broke out in 1812, the government ordered the fort to be abandoned, fearing it could not be held. On Aug. 15 Capt. Heald marched out with the garrison and others, and when a mile and a half from the fort he was

attacked by the Pottawattamie Indians, who killed 26 regulars, 12 militiamen, 2 women, and 12 children, and then destroyed the fort. In 1816 Capt. Bradley rebuilt the fort, which was occupied by the United States till 1837, and then abandoned, as the Indians had removed beyond the Mississippi Oct. 1, 1835. The fort was demolished in 1856, but one of the outbuildings remained till it was burnt down in the great fire. On March 2, 1827, congress granted to Illinois every alternate section of land on each side of the line of the proposed Illinois and Michigan canal, to aid in its construction, to connect Chicago with the head of navigation on the Illinois river. On Jan. 22, 1829, the state organized a board of canal commissioners, with power to lay out towns along the line. Under them James Thompson surveyed the town of Chicago, his

first map being dated Aug. 4, 1830; it embraced an area of three eighths of a square mile. In 1831 it contained about 12 families, besides the garrison in Fort Dearborn. The town of Chicago was organized Aug. 10, 1833, with 5 trustees; it contained 560 acres, 550 inhabitants, 29 voters, 175 buildings, and property valued at \$60,000; the taxable valuation was \$19,560, and the first year's taxes were \$48 90. On Sept. 26, 1833, 7,000 Pottawattamies assembled there in council, and signed a treaty to remove beyond the Mississippi; they ceded some 20,000,000 acres to the United States for \$1,100,000. Chicago was incorporated as a city March 4, 1837. The first election under the charter was held May 1 following, when W. B. Ogden was chosen mayor. The first census was taken July 1, 1837, when the city contained a population of 4,170. The



Chicago after the Fire. (Scale, 1 inch to the mile.)

rapid growth of Chicago in population and commercial importance is without a parallel; while the energy of the citizens is attested by the many gigantic public improvements that have been successfully completed at immense cost.—In October, 1871, Chicago was the scene of one of the most destructive conflagrations of modern times. There had been several unusually large fires on previous days, but on Sunday evening, Oct. 8, the great fire originated in a small wooden barn in De Koven street, in the southern part of the West division, near the river, from the upsetting, as is supposed, of a lighted kerosene lamp. The buildings in that quarter were mostly of wood, and there were several lumber yards along the margin of the river. Through these the flames raged with great fury, and were carried across the South branch by the strong westerly wind then prevailing, and thence swept into the South

division, which was closely built up with stores, warehouses, and public buildings of stone, brick, and iron, many of them supposed to be fire-proof. The fire continued all day Monday, and crossed the main channel of the Chicago river, sweeping all before it in the North division, which was occupied mostly by dwellings. The last house was not reached till Tuesday morning, and many of the ruins were still burning several months afterward. The total area burned over, including streets, was 2,100 acres, or nearly $3\frac{1}{2}$ sq. m.; number of buildings destroyed, 17,450; persons rendered homeless, 98,500; killed, about 200. Among the buildings were the court house, custom house and post office, chamber of commerce, gas works, 3 railroad depots, 9 daily newspaper offices, 32 hotels, 10 theatres and halls, 8 public schools and several branches, 41 churches, 5 elevators containing 1,642,000 bushels of

grain, and all the national banks but one. The loss on buildings was \$50,000,000, and on personal property and merchandise \$140,000,000; total, \$190,000,000, of which about \$44,000,000 was recovered on insurance. Including depreciation of real estate and loss to business in consequence of the fire, the grand total of pecuniary damage has been estimated at over \$200,000,000. The property in the city before the fire was valued at \$620,000,000; the loss, therefore, was about one third of the entire property. The total losses by insurance companies amounted to \$96,533,721 of which about \$6,000,000 was sustained by foreign companies, and the remainder by companies of the United States. In consequence of their losses 57 of these companies were forced to suspend payments. The suffering occasioned by the fire was very great, and elicited prompt expressions of sympathy and offers of material aid from all parts of the United States, and from various cities of Europe. A relief and aid society was immediately formed to receive and distribute the supplies and funds contributed. According to a report of the society, published Nov. 7, about one month after the fire, \$3,500,000 had then been subscribed, of which \$2,050,000 had been paid; the society was then aiding 60,000 persons. The legislature of Illinois was promptly convened in extra session, and adopted measures of relief for the city. The whole amount contributed in money, provisions, and clothing for the relief of the sufferers reached nearly \$7,000,000. The business of the city was paralyzed but a short time. Before winter many merchants were doing business in extemporized wooden structures, and the rest in dwellings; while the sufferers who could not procure other homes were cared for in board barracks. In a year after the fire a large part of the burnt district had been rebuilt, at an expenditure of \$40,500,000, and \$4,000,000 worth of buildings were erected outside the fire limits; while the mercantile business and produce movements were much larger than ever before. The work of rebuilding is now (1873) advancing almost as rapidly as in 1872; and scarcely a trace of the disaster will be left in three years from the date of the occurrence, except in the improved character of the new buildings over those destroyed.

CHICCORY, or *Succory* (*cichorium intybus*), or the wild endive, a plant belonging to the same family as the dandelion, found growing wild in most parts of Europe, and in England in great profusion. It is also naturalized in this country, and is seen in the fields and roads along the fences in neighborhoods long settled. It blossoms in August and September, and may be easily recognized by its bright blue flowers. In its natural state the stem rises from 1 to 3 ft. in height, though under cultivation it may be brought to a height of 6 ft. The root is fleshy and milky. Chiccory was formerly used to a considerable extent for medicinal purposes, and is still thought by

some to be beneficial, if taken freely, in the early stages of jaundice and visceral obstructions, &c. It is employed almost exclusively of late as a substitute for coffee, or in the adul-



Chiccory.

teration of this article. When prepared for this purpose, the roots are dried and reduced to powder, which resembles in color ground coffee, but it has neither the essential oil nor aromatic flavor of coffee. Its cheapness recommends it to the poor, and the beverage is by no means unpleasant. Large crops of chiccory are raised in England for the acknowledged purpose of adulterating coffee, and the sale of this mixed article is legalized, under the proviso that each package be labelled "Mixture of Coffee and Chiccory." By chemical analysis, it has been found that chiccory possesses few elements in common with coffee, and contains very little of the nutritive properties of which so high an opinion is sometimes entertained. In cases where it is used for a long time its effects are often deleterious, especially upon the nervous system. Notwithstanding the great cheapness and abundance of chiccory it does not escape adulteration. The substances used for this purpose are roasted wheat, rye, acorns, carrots, and a variety of similar articles, and even, it is said, exhausted tar, or "croats," and oak-bark powder.

CHICHEN, or *Chichen Itza*, an ancient city of Mexico, in the state and peninsula of Yucatan, about 35 m. S. W. of Valladolid; lat. 20° 15' N., lon. 88° 30' W. Notwithstanding the appearance of great antiquity of these ruins, which are perhaps the most remarkable in all Yucatan, they are in a better state of preservation than any others; but they have the distinguishing feature common to all of them, namely, the impossibility of ascertaining the purpose or uses of the extraordinary structures which still stand in testimony of the high degree of civilization of a people long since forgotten. According to Stephens, the most curious and at the same time the most incomprehensible ruins he had met with were a series

of columns at Chichen, the highest of which do not exceed 6 ft., so disposed as to form a vast parallelogram, each row being 3, 4, and 5 ft. deep from the outside to the enclosed space



Chichen.

within. In the immediate vicinity of the area comprised within these pillars is the *castillo* or castle, rising from the same plane, and occupying the top of a lofty pyramidal mound which measures at its base on the N. and S. side 196 ft., and on the E. and W. side 202 ft., and is 75 ft. in height. The four sides of the building itself measure 43 and 49 ft. respectively in the same directions as the mound.

CHICHESTER (anc. *Regnum*), a city of England, capital of the county of Sussex, at the termination of a gentle slope from the South Down hills, 53 m. S. W. of London, and 14 m. E. N. E. of Portsmouth; pop. in 1871, 8,205. It is surrounded by an old but well preserved wall $1\frac{1}{2}$ m. in circuit, lined with elms, and forming a pleasant walk. There are four main streets radiating from a central square, where there is an elegant cross, erected in 1478. Most of the houses are of brick with tiled roofs, and many are built with considerable taste. The principal edifice is the cathedral, erected in the 13th century, upon the foundations of one erected in 1108, and exhibiting specimens of nearly every style of Gothic architecture. The beautiful octagonal spire, 300 ft. high, built in the 14th century, fell down in 1861, in consequence of some repairs which were in progress, and a new one was erected in 1866. One of its most striking features is a monument to the poet Collins, who was born and died in this city. It has eight other modern monuments by Flaxman, and many more of some antiquity. The extreme length of the cathedral is 407 ft., and its breadth 150 ft. The transept is 129 ft. long by 34 ft. broad. Near the N. W. angle is a massive bell tower, 120 ft. high, and on the S. is a quadrangle enclosed by cloisters and containing the churchyard. There is a blue coat school founded in 1702 and enjoying an income from endowment of £1,300 per annum. There are also a diocesan

theological college, and a training college founded by Bishop Otter in 1841, with a model school attached to it. Two hundred years ago nearly all the needles made in England came from this town, but the only manufactures now are coopers' and other wooden ware, leather, parchment, and candles. Extensive corn and cattle markets are held. The town has communication with the sea at Chichester harbor, by means of a branch of the Arundel canal, used chiefly for the transportation of coal.—The name Chichester is supposed to be a corruption of Cissanceaster, the camp of Cissa, an Anglo-Saxon chief who repaired it after its partial destruction by the South Saxons under Ælla in 491. It was the capital of the kingdom of Sussex till its conquest by the West



Chichester Cathedral.

Saxons. In December, 1642, the parliamentary forces took it from the royalists, and in 1648 the parliament caused its fortifications to be destroyed. The see of Chichester was originally founded at Selsea in the 7th century, and removed to Chichester toward the end of the 11th. The income of the bishop is £4,200 a year. Chichester gives the title of earl to the Pelham family.

CHICKADEE. See BLACKCAP.

CHICKAHOMINY, a river in S. E. Virginia, near which were fought several important battles during the civil war. It rises in swampy uplands about 20 m. N. W. of Richmond, flows S. E. about 50 m. parallel with and about midway between the James and York rivers, then turns sharply S., and after a winding course of nearly 20 m. falls into the James, about 40 m. S. E. of Richmond, and 10 m. W. of Williamsburg. Toward its mouth it becomes a consid-

erable stream, navigable by small steamers. The military operations of 1862 and 1864 embraced that portion of the river from Bottom's bridge on the south, where it is crossed by the Williamsburg turnpike, to Meadow bridge, 15 m. N. W., where it is crossed by the Fredericksburg railroad. Richmond lies nearly opposite the centre of this line, about 6 m. from the Chickahominy at its nearest approach. Between these points the river flows through a wooded swamp a few hundred yards wide, from which the land slopes gently up about 100 ft. to the level of the surrounding country. In dry weather the stream is here a mere rivulet; but a moderate shower fills the channel, which is a dozen yards wide and 4 ft. deep; a continuous rainfall floods the swamp and overflows the adjacent bottom lands. These are intersected by deep ditches, and even when not overflowed are so soft as to be impassable for cavalry and artillery. The stream was crossed by several rude bridges, and there were here and there fords, accessible only in dry weather. The spring and summer of 1862 were unusually rainy; the channel was always full to the brim, and every shower flooded the swamp and bottoms. Infantry might possibly have picked their way in loose order through the swamp; but horses would have sunk to their girths, and artillery and trains to the axles. An army could cross only by bridges built above the level of the highest floods, and provided with long approaches through the swamps. As a military obstacle the narrow Chickahominy, with its bordering swamps, is more formidable than a broad river which can be crossed by boats, or over which a pontoon bridge may be thrown in a few hours.—Early in the spring of 1862 the Union army of the Potomac, under Gen. McClellan, disembarked near Fortress Monroe, with the design of moving upon Richmond. The natural approach by the James river was commanded by the confederate iron-clad Merrimack, and it was resolved to march up the peninsula formed by the York and James rivers. This peninsula is about 60 m. long, with an average breadth of 12 m. The lower part is covered with swampy forests, and intersected by sluggish creeks. The roads are few and hardly passable by vehicles. After some trials McClellan decided that he could not move his army directly up the peninsula, but must invest and capture Yorktown, near the mouth of the York river, or rather estuary. Yorktown captured, his base of operations would be at West Point, near the junction of the Pamunkey and Mattaponi, which form the York, whence a railroad runs to Richmond, 30 m. W., crossing the Chickahominy about midway. **I. WILLIAMSBURG.** The siege of Yorktown was the initial step in the peninsular campaign of 1862. Strong works had been here erected, which were placed under the command of Gen. Magruder, who had at the outset barely 15,000 men to defend Yorktown, Gloucester point, on the opposite side of the

York river, and the line across the peninsula, here about 10 m. broad. But the confederate force in northern Virginia numbered about 50,000, of whom 38,000 were soon transferred to Yorktown, so that by April 17 Gen. J. E. Johnston, who now took the command, had 53,000 men, exclusive of cavalry. Against these McClellan had on the 30th 112,000 present for duty, and 6,000 sick and on special duty. The siege of Yorktown began April 5, and by the close of the month the batteries were nearly completed. The 6th of May was fixed upon as the day when fire was to be opened. But two days before Johnston evacuated his works, carrying away everything worth taking; his trains and the mass of his troops were well under way toward Richmond hours before their departure was known by the besiegers. The Union cavalry started in pursuit, and came up with the rear of the enemy, who made a stand near Williamsburg, where some works had been previously erected. Hooker's division soon came up, and on the morning of the 5th commenced a vigorous attack, which was continued throughout the day by a constantly increasing force. Longstreet, who commanded the confederate rear, had gone beyond Williamsburg; but he turned back, and a severe action ensued, which toward evening was decided by a brilliant bayonet charge by Hancock's division. The confederates then abandoned their works; but they had delayed the pursuit long enough for their trains to be beyond reach. The Union loss at the battle of Williamsburg was 1,856 killed and wounded, and 372 missing, more than two thirds of which was in Hooker's division of 9,000 men. The confederate loss is unofficially stated by Gen. Johnston to have been about 1,800; but it was probably considerably larger, for 800 wounded were found next day in the hospitals at Williamsburg, besides many in private houses. "Sickness and the fight at Williamsburg," says Johnston, "reduced our number by 6,000."—McClellan's advance was slow. The right wing kept to the north, striking the Chickahominy at New bridge, directly in front of Richmond; the left, keeping to the south, reached the river at Bottom's bridge, 13 m. below, on May 20. The bulk of the confederates were across the stream, and a detachment at Mechanicsville was easily brushed away by an artillery fire. On the 20th a Union division crossed the river, occupied the high ground, and made two reconnoissances, one reaching beyond the Seven Pines to within four miles of Richmond. The enemy was nowhere found in force, and no traces of defensive works were discovered. The two corps of Keyes and Heintzelman were then sent across the river, taking up their position near the Seven Pines. Johnston, in his retreat, had neglected to tear up the railroad from Richmond to the Pamunkey. He had indeed partially destroyed the bridge by which it crossed the Chickahominy; but by the 26th the road was in operation up

to the river, and the bridge was nearly reconstructed. There was no military reason why the whole Union army should not then have crossed the Chickahominy by Bottom's bridge and the railroad bridge, and moved directly upon Richmond, where the confederate force numbered 54,000. But McClellan, who had considerably more than 100,000, greatly overestimated the numbers opposed to him. He urged that McDowell, who had 32,000 near Fredericksburg, should be sent to him. This had indeed been promised; but the operations of Jackson in the valley of the Shenandoah alarmed the federal authorities, and McDowell was detained to prevent an anticipated attack upon Washington. II. HANOVER COURT HOUSE. Meanwhile McClellan learned on May 25 that there was a considerable body of confederates at Hanover Court House upon his right and partly in his rear. This force consisted of 13,000 raw troops from North Carolina, who were coming down from Gordonsville to Richmond. McClellan supposed that they were moving up from Richmond, and were "in a position either to reinforce Jackson, or to impede McDowell's junction, should he finally move to join us." Fitz John Porter was directed to dislodge this force on the 27th. A fight ensued, the results of which, says McClellan, "were some 200 of the enemy's dead buried by our troops, 730 prisoners sent to the rear, one 12-pound howitzer, one caisson, a large number of small arms, and two railroad trains captured. Our loss amounted to 53 killed, 344 wounded and missing." The confederates, however, reached Richmond, raising Johnston's force to 67,000. III. SEVEN PINES AND FAIR OAKS. On May 28 the Union force was thus posted: The corps of Heintzelman and Keyes, forming the left wing, were on the west side of the Chickahominy, massed checkerwise for a distance of 6 m. along the Williamsburg road. The stronger corps of Sumner, Franklin, and Porter, forming the right wing, were stretched for 18 m. along the east bank of the river. The two wings formed an acute-angled triangle of unequal sides, the apex being at Bottom's bridge. The distance from centre to centre of the wings was barely 5 m., but between them was the Chickahominy, over which there was then no practicable passage except by Bottom's bridge. If the left wing were assailed in force, the right could come to its aid only by a march of about 23 m., which in the condition of the roads at that time could not be made with artillery in less than two days. For a hostile commander with anything like an equal force, there were two courses open: He might throw himself upon the weaker left, with a probability of annihilating it; or he could assail the extremity of the right wing, threatening its weakly guarded line of communications with West Point. Johnston at the end of May tried the first and most obvious plan, and failed by mere accident. Lee, a month later, tried the second plan, and

succeeded, against all military probability. On May 30 Johnston learned the general position of the enemy; he however supposed that only one corps instead of two was across the river, and presumed that he had but 20,000 to deal with, whereas the actual number was something more than 30,000. The attack was to be made by the four divisions of Huger, Smith, Longstreet, and D. H. Hill, numbering about 50,000. During the afternoon and night of the 30th a violent storm swept over the region. The channel of the Chickahominy was already full to the brim, and the stream swollen by the rain would overflow swamp and bottom lands, preventing any aid being sent from the right wing to the left. The attack was to be made simultaneously at daybreak on the 31st. The storm delayed the movements of the troops; but by 8 o'clock Longstreet was in position, waiting for the arrival of Huger, who did not make his appearance. Soon after noon he began the attack. Casey's division of Keyes's corps was three quarters of a mile in advance of the Seven Pines, its pickets being thrown a third of a mile further up to the edge of a wood. The confederates burst through this screen, forced back the pickets to the intrenchments, where a stand was made, and the position was held for three hours against greatly superior numbers; but both flanks being turned, Casey fell back to the Seven Pines. The confederate attack here had been made by the division of Hill. Longstreet now pressed upon the Union centre and left. After an hour and a half of stubborn resistance, the Seven Pines was abandoned, and the troops fell back to a belt of wood, where Heintzelman succeeded in rallying about 1,800 men, who formed a firm front, and poured in a fire so deadly that the assault was checked. The confederates, who had forced the enemy back for two miles, now fell back a little, and passed the night in the camps which they had won; the federals also fell back a mile to an intrenched camp.—Meanwhile another action had been going on at Fair Oaks station, hardly a mile away. The noise of the battle had been heard across the Chickahominy; and McClellan, who was confined to his bed by illness, directed Sumner, who had just constructed two bridges over the Chickahominy, to hold himself in readiness to cross. The river had begun to rise, and the bridges were almost impassable; many of the timbers were already floating. Two of Sumner's divisions, under Sedgwick and Richardson, were advanced to the head of the bridges, ready to cross the moment orders were given. Late in the afternoon tidings came that the battle was going hardly, and Sumner was ordered to move. Sedgwick's division, which got over the shaking bridge, dragged its artillery through the swamp, and, guided by the noise of the firing, moved upon Fair Oaks, where a single brigade of Couch's division of Heintzelman's corps, which had become separated from the main body, was momentarily expecting an attack from Smith's divi-

sion of the confederates. Fair Oaks is somewhat nearer Richmond than the Seven Pines, and here Johnston had posted himself to direct the general conduct of the whole battle. Sumner now took command here, and received the attack, which began at 4 o'clock, and lasted until twilight, when a vigorous charge hurled the confederates back in confusion; and the action here closed at almost the same time with that at the Seven Pines. At this moment Johnston was severely wounded, and just afterward Richardson's division of Sumner's corps came upon the field. The bridge by which it had attempted to cross the Chickahominy had been found impassable, and it was necessary to go to that by which Sedgwick had already crossed. The division was posted, and the two armies bivouacked on the field, so near together that their pickets were within speaking distance. Johnston being disabled, the command of the confederates devolved upon Gen. G. W. Smith, who the next morning (June 1) decided not to attack at the Seven Pines; but the action was renewed near Fair Oaks, the confederate attack falling mainly upon Richardson's division, which had not as yet been engaged. Meanwhile Hooker had come up from the left, and after an hour's hard fighting pushed the enemy from the woods by which they had been sheltered. The confederates along the whole line retreated in confusion to Richmond. The actions of the Seven Pines and Fair Oaks were fought by the confederates with a much smaller force than had been contemplated by Johnston; for Huger's division got lost in the swamps, and never appeared on the field. The entire attacking force was about 38,000. When strengthened by Sumner's two divisions, the entire Union force on that side of the Chickahominy was about the same; but at the beginning of the action they were considerably scattered, while the confederates were massed upon the assailed points; so that on the 31st the confederates had a decided preponderance in action, but the federals had the advantage of slight intrenchments. The Union loss is officially stated at 890 killed, 3,627 wounded, 1,222 missing; 5,739 in all. The confederate loss was probably rather more, but no official statement appears to have been made. Johnston says, "Longstreet reports the loss in his command at about 3,000; Smith reports his loss at 1,233," 4,233 in all; but no mention is made of the loss in Hill's division, which is elsewhere stated to have been 2,500, which would give a total of 6,733. At Richmond these battles were considered a total defeat; and there is little doubt that had McClellan then moved his whole force against Richmond, the city would have fallen into his hands, for as yet it was defended by none of the works which within a few weeks became formidable. Smith held the command only two days, when, being partially disabled by a paralytic stroke, he was replaced by Gen. R. E. Lee.—After the battle of Fair Oaks McClellan for some time

devoted his attention to building new bridges across the Chickahominy. By June 20 eleven of these were measurably complete, of which seven were available for army transport. Earthworks of no great strength were also thrown up in front of the line on the west side of the river, and the bulk of the Union army was gradually transferred to that side. The position was in the midst of a swampy region, and notwithstanding considerable reinforcements, the number and strength of the army very considerably declined. On June 13 Stuart with 1,500 cavalry started upon a daring raid clear around the Union army. He reached the White House, McClellan's main depot on the Pamunkey, destroyed some stores, and recrossed the Chickahominy 14 m. below the Union left, losing only a single man in the expedition. Lee, whose force had by this time become considerably augmented, now resolved upon an important movement. This was to cross the Chickahominy above the Union right, and attack the force on the east bank of the stream. Jackson, who had gathered a considerable army in the valley of the Shenandoah, was to move down and cooperate in this movement; but to veil it, a considerable force was ostentatiously sent from Richmond toward the Shenandoah, giving the impression that a movement from that quarter upon Washington was in contemplation. The ruse only partially succeeded. If the force at Richmond was weakened, the city would be by so much the more open to assault. This was now fairly contemplated by McClellan. By June 24 four of his five corps were across the Chickahominy, leaving only Fitz John Porter with 36,000 men on the east bank. On the 25th the Union lines were pushed half a mile forward, and a desultory engagement occurred at a place known as King's school house, each side losing some 600 men. This was preparatory for a general forward movement which McClellan designed on the next day. At 5 o'clock he telegraphed to Washington that the affair was over; he had gained his point, and all was quiet. An hour and a half later he sent a quite different despatch. Jackson's advance was at Hanover Court House; Beauregard was at Richmond; there were 200,000 men opposed to him, and he should probably be attacked the next day; he would do all he could, and if his army was destroyed by overwhelming numbers, he could at least die with it; if the result of the coming engagement should be disaster, he was not responsible for it. This was partly correct. Lee had also fixed upon the 26th for an offensive movement; Jackson's whole force, not merely his advance, was at Hanover Court House. But Beauregard was in Alabama, not in Richmond; and the confederate force, instead of being 200,000 strong, numbered barely half as many. Instead of having to meet an overwhelming force, McClellan had a slight preponderance, having with him on the Chickahominy about 103,000 men present for duty,

while Lee had, including those coming on with Jackson, about 100,000. An allowance of 5,000 on either side will cover all possible errors in this estimate. Lee had reasoned that McClellan intended to lay siege to Richmond by regular approaches. The city was in no condition to sustain a prolonged investment, for it had not provisions for a fortnight, and its sources of supply were precarious and liable to interruption. His object was to raise the siege by attacking McClellan at the point where he was most vulnerable; that is, by threatening his line of supply on the east side of the Chickahominy. For this purpose the divisions of Huger and Magruder, 24,000 strong, Holmes's division of 7,000, which was posted at Fort Darling on the James river, and the reserve artillery and cavalry, 3,000 more, were to be left on the Richmond side; while A. P. Hill, Longstreet, and D. H. Hill, with 34,000, besides 2,000 cavalry under Stuart, were to cross the Chickahominy and unite with Jackson's command, 30,000 strong, and fall upon the enemy on that side. IV. MECHANICSVILLE. The divisions from Richmond began moving during the night of Thursday, June 25, and reached their assigned positions at 8 o'clock the following morning. They waited till the afternoon for Jackson's approach. He had been delayed, and at last A. P. Hill crossed the stream beyond the extreme Union right, and moved down the bank until he came upon two brigades of McCall's Pennsylvania reserves strongly posted behind Beaver Dam creek, a small stream falling into the Chickahominy. The creek was five or six yards wide, with steep banks, the water being waist deep. The roads approaching it were commanded by artillery, and the whole line was defended by rifle pits and felled trees. The confederates made several determined attacks, which were repelled; and at 9 o'clock they fell back, having lost 1,500 men. The federals, fighting under cover, lost barely 300. In this action, sometimes called the battle of Mechanicsville, sometimes that of Beaver Dam creek, the Union force engaged consisted of the brigades of Reynolds and Seymour, 6,000 strong; that of the confederates of five brigades, numbering 12,000.—From the moment that McClellan learned of the approach of the enemy, he gave up all thought of holding his position on the east bank of the Chickahominy, and began to execute the plan which he had already conceived of changing his base from the York to the James; a wise operation, which had been perfectly feasible since the destruction of the Merrimack on May 11. The quartermaster at West Point was ordered to forward supplies to the front till the last moment, and to send the remainder to the James, burning everything which could not be got off. His change of base required that the whole army should be united on the west side of the Chickahominy. McClellan proposed to hold the enemy in check for a few hours on the east side until all his trains could be got over. The

position at Beaver Dam creek was considerably in advance of the main line, and though unsailable in front could be easily turned. V. COLD HARBOR. During the night of the 26th the troops were quietly withdrawn. Porter's line was posted 5 m. below. The 30 heavy guns which had been placed in batteries between these points, together with nearly all the trains, were safely conveyed over, and the New bridge partially destroyed. There was indeed no necessity for fighting the battle which ensued, for the whole Union army might easily have got over hours before the enemy came in sight on the 27th. The Union position was well chosen. A small stream falling into the Chickahominy was in front. The banks were usually fringed with a belt of swamp; but here and there they were steep. The land rises into a flat table land, with patches of forest and cultivated fields. Two places are named on the maps, New Cold Harbor, near the Chickahominy, and Cold Harbor, a mile northward, each consisting of three or four dilapidated houses. Cold Harbor formed the centre of Porter's semicircular line, which covered the bridges across the river. Some rifle pits had been dug and a few trees felled along the sides of the slope, which was crowned with artillery, so that the guns could play over the heads of the infantry upon an advancing enemy. The confederates were astrid dawn, but it was two hours before they began to move. A. P. Hill and Longstreet kept to the right, along the bank of the Chickahominy. D. H. Hill bore to the left in order to unite with Jackson, who had encamped near by. About noon the right column came to Gaines's mill, where a slight encounter took place, from which has been given one of the names by which the whole battle is designated. At 2 o'clock A. P. Hill came in sight of the main Union force drawn up on the hillside beyond the creek. The plain in front, a quarter of a mile wide, was swept by artillery and partly commanded by heavy guns on the opposite side of the Chickahominy. The confederates charged across the plain, floundered through the morass, and pressed up the slope in the face of a fierce fire of artillery and musketry. Some regiments even pierced the Union lines. The battle here raged for two hours, but the assailants were at length driven back in apparent rout. Longstreet's division had been drawn up in the rear of Hill, sheltered by a low ridge. Lee directed him to make a feigned attack upon the Union left, in order to relieve Hill. He found that the force there was too strong to be disturbed by a feint, and that he must make a real attack. Jackson had now come up on the Union right. The direction of the firing showed that on the left A. P. Hill and Longstreet were falling back. Lee ordered a general assault. Porter, seeing the great force advancing upon him, had two hours before asked for reinforcements from the other side of the Chickahominy. Slocum's division had been all day kept in readi-

ness for that purpose. It had begun to cross at daybreak, but was recalled when half over. It was now ordered to move, and came upon the field at half past 4. Porter's line was so severely pressed everywhere that he was compelled to send Slocum's division, regiment by regiment, to the most vital points. Still for more than an hour Jackson gained no ground. Lawton's Georgia brigade, 4,000 strong, which had been held in reserve, was now ordered up. It was half past 6, an hour before sunset. The whole force, except a single confederate brigade held in reserve, was now in action. Making allowance for losses on both sides, the confederates on the field numbered 56,000, the federals 33,000. The Union force was thus pressed along its whole line by almost double its numbers. It gave way almost simultaneously on the right, centre, and left. It was not a rout, but fast threatening to become one. The core of every division remained solid, but fragments were flying off on every side, and all were pressing toward the bridges across the Chickahominy. At this moment the brigades of French and Meagher came over the river, dashed through the stragglers, and up the bluff. The regiments in retreat rallied and faced the pursuers, who fired a few ineffectual volleys, and withdrew as night set in. An hour earlier these two brigades would have secured a victory; as it was, they just prevented a disastrous rout. This action of June 27 has been called the battle of Gaines's Mill, but is more properly that of Cold Harbor; Lee calls it the battle of the Chickahominy. The confederate loss in killed and wounded was 9,500; the Union loss 4,000, besides about 2,000 prisoners, and 22 guns. During the whole of this action McClellan had remained on the west side of the Chickahominy, where the confederates kept up a show of force far greater than they possessed. For this the formation of the country furnished special facilities. There was a continuous series of swamps, gullies, and ridges, which shut out from view all that was passing at the distance of a few hundred yards. A force would show itself at one point, vanish, and reappear at another; no one could tell whether it was a regiment or a division. An artillery fire might be a feint or the prelude to an attack in force. These movements deceived not only McClellan but Sumner and Franklin, both of whom thought they were confronted by superior numbers. But the only affair which rose even to the dimensions of a skirmish occurred near sunset, when two confederate regiments attacked a strong picket line at Peach Orchard, and out of 650 men lost 200.—Lee had won a formal victory, in which he suffered double the loss which he had inflicted. But he had placed himself in a perilous position. Two thirds of his force, now not more than 54,000, was east of the Chickahominy, the remaining 35,000 on the west, of whom 7,000 were across the James. Between them lay McClellan with

fully 96,000. A third of this would easily have guarded the river; the remainder could have marched into Richmond in five hours. The fall of Richmond would have involved the dissolution of the army across the Chickahominy, for it had marched out with only three days' supplies; and out of Richmond the confederates had not within 100 m. food to supply the soldiers for a week. The confederate army after the battle of Cold Harbor was in just the position in which an enemy would wish it to be. McClellan, instead of assaulting or besieging Richmond, resolved to move to the James river. VI. SAVAGE'S STATION. The problem, sometimes called the "change of base," but in reality a retreat, was a very simple one. It was to march 10 or 15 m. with no enemy in front, but with one supposed to be superior upon one flank and possibly in the rear. White Oak creek falls into the Chickahominy three or four miles south of the left of the Union position at the Seven Pines. It is bordered by White Oak swamp, which toward Richmond is several miles wide, and slopes up into a wooded tract extending to the James river. Three main roads, the Charles City, Darbytown, and Newmarket, starting from near Richmond, diverge southeastward toward the Chickahominy, skirting the swamp on its southern side. The region is intersected by obscure cross roads, upon which there is here and there a clearing. In this region took place the engagements of June 30. The line of the retreat lay through White Oak swamp. The trains, which if drawn up in a single line would have stretched a distance of 40 m., and were accompanied by a herd of 2,500 cattle, were got safely over the creek by noon of the 28th, and, preceded by Keyes's corps, moved toward Malvern hill on the James, which they reached without molestation on the morning of the 30th. The corps of Franklin and Porter followed on the morning of the 29th, leaving those of Sumner and Heintzelman to protect the rear. The works at Fair Oaks and Seven Pines were abandoned, and the two corps fell back to Savage's station, on the railroad, where were the hospitals and depots of the army, which they were directed to hold till nightfall. Heintzelman moved away before the time, leaving orders for the destruction of such stores as could not be carried off. The provisions were piled up and burned. The ammunition and shells were heaped upon a train, which with a full head of steam was sent down the railroad toward the river; as it started the train was set afire, and before it reached the bridge the shells began to explode. The rails across the bridge had been removed; but so great was the momentum that the engine and one car leaped across the chasm and landed on the opposite side. At the same instant the whole mass of powder exploded, and the other cars plunged into the mud of the river. Magruder in the mean time moved cautiously down the railroad, somewhat harassing the retreat, and at half past 5 made an attack at

Savage's station, then occupied by Sumner. Darkness put a close to the action; and during the night Sumner moved off, leaving behind 2,500 sick and wounded in the hospital. In the engagement at Savage's station the Union loss was about 600, that of the confederates 400.

VII. FRAZIER'S FARM. Early on the morning of the 30th Magruder and Huger were directed by Lee to move from Richmond down the Charles City and Newmarket roads to take part in the flank attack which was meditated, in which they were to be joined by Holmes and Wise from Fort Darling. In this attack the entire effective confederate force, numbering more than 85,000, was to take part. Early on the morning of the 29th A. P. Hill and Longstreet crossed the Chickahominy by the New bridge, which had been only partially destroyed on the 26th, passed through the deserted Union lines almost to Richmond, turned eastward, and heading the White Oak swamp moved down the Darbytown road, and at nightfall, after a march of 20 m., encamped not far from the centre of McClellan's retreating column. The day had been intensely hot, and many of the men dropped from the ranks. The Union line was 8 m. long, the head having almost reached Malvern hill, the rear being at the crossing of White Oak creek. The bridges over the Chickahominy in front of Jackson were down, and he was unable to repair them until the morning of the 30th, when he crossed, and by noon came to White Oak creek, the bridge over which was destroyed, and all the approaches commanded by artillery. He was detained here all the afternoon, unable to take part in the battle which was going on two miles distant. Early in the morning Holmes and Wise had come in sight of the head of McClellan's column, upon which they opened a distant fire; but a few rounds of artillery and a few shells from the gunboats scattered their force, which took no further part in the operations which ensued. Longstreet and A. P. Hill resumed their march down the Darbytown road, and at noon came in sight of a part of the Union line drawn up at Frazier's farm, near a point where a road leading from the James crosses those from Richmond. Huger was supposed to be moving by the Charles City road upon the same point; but he mistook the way, and did not make his appearance that day, and on the next he was virtually removed from the command of his division. The Union line was so long that it was unoccupied in places. McCall's division was at Frazier's farm; Kearny's on his left, on his right that of Hooker, and beyond him Sumner's corps. Keyes's and Porter's corps had nearly reached Malvern hill; Franklin's corps was in the rear, at White Oak creek. At 4 o'clock the attack was begun upon McCall by Kemper's brigade of Longstreet's division, which had not as yet been engaged, having been kept in reserve at Cold Harbor. It was driven back, losing in a few minutes 250 killed and wounded and 200 prisoners, a quarter of

its whole number. Other divisions were sent in, and McCall was forced back for a space; then the enemy were checked by Hooker, and in return driven back. The whole action now took the form of a desultory fight, each brigade on both sides acting almost independently; batteries were taken and retaken, and ground lost and won by each army; but when night closed in the advantage seemed somewhat on the Union side. McCall's early repulse in the centre had been retrieved, and Hooker and Kearny had gained something on the right and left. Of all the reports on both sides, that of A. P. Hill is the most accurate: "On our extreme right matters seemed to be going badly. Two brigades of Longstreet's division had been roughly handled, and had fallen back. Archer was brought up and sent in, and affairs were soon restored in that quarter. At about dark the enemy were pressing us hard along our whole line, and my last reserve was directed to advance slowly. Heavy reinforcements to the enemy were brought up at this time, and it seemed that a tremendous effort was being made to turn the fortunes of the day. The volume of fire that approaching rolled along the line was terrific. Seeing some troops of Wilcox's brigade who had rallied, they were rapidly reformed, and, being directed to cheer long and loudly, moved again to the fight. This seemed to end the contest, for in less than five minutes all firing ceased, and the enemy retired." The attempt to break the Union line had failed. The action was hardly over when the federal retreat was resumed. The rear of the wagon train and artillery had reached Malvern hill at 4 o'clock in the afternoon; and before daylight the last division had come up and taken the position assigned to it. The battle of Frazier's farm, or Charles City cross roads, as it is sometimes called, was fought on the confederate side wholly by the divisions of A. P. Hill and Longstreet. They had crossed the Chickahominy 24,000 strong, and had in the mean time lost 8,200 in killed and wounded. They were so exhausted by four days' continuous marching and fighting as to be unable to take any part in the battle of the next day. The Union loss on this day was about 300 killed and 1,500 wounded; that of the confederates 325 killed and 1,700 wounded.

VIII. MALVERN HILL. On the morning of Tuesday, July 1, the Union army was posted in a strong position at Malvern hill, an elevated plateau a mile and a half long, and half as broad. The flanks were well covered by woods; in front were gullies rendering the approach difficult except by the roads which crossed them. On the crest of the hill seven heavy siege guns were placed in position, and the artillery was so posted that a fire of 60 guns could be concentrated upon any point which might be assailed. The position was one which could be held against a double force. McClellan had about 90,000 men; Lee, counting every man except the divisions of A. P. Hill and Longstreet, not more than 60,000,

with only a portion of which he undertook to storm the Union position. It is clear that he all along vastly underrated the strength of the enemy. When he crossed the Chickahominy on the 26th, he supposed that the greater part of McClellan's army was on the east side; but at Cold Harbor he himself had clearly a great preponderance of numbers, and he might fairly assume that the enemy was weak on the other side, otherwise he would have brought more men upon that field. At Frazier's farm the two divisions of Hill and Longstreet evidently were as strong as the force opposed to them; and if they were too much exhausted to be brought into action, so too would be those with whom they had fought. The dispositions made by Lee for the attack clearly evince that he did not suppose himself to be confronted at Malvern hill by an effective force of more than 50,000 men. At 9 o'clock in the morning Jackson received orders to attack. Including D. H. Hill's division, which now formed a part of his command, he had, after deducting all losses, about 35,000 men. Hill, being on the confederate right, was opposite the Union left, where Hooker was posted. He suffered so severely from the artillery fire that he halted to reconnoitre, and found the enemy, as he reports, "strongly posted on a commanding hill, all the approaches to which could be swept by his artillery and guarded by swarms of infantry, securely sheltered by fences, ditches, and ravines. Tier after tier of batteries were grimly visible on the plateau, rising in the form of an amphitheatre. We could only reach the first line of batteries by traversing an open space of from 300 to 400 yards, exposed to a murderous fire of grape and canister from the artillery, and musketry from the infantry. If that was carried, another and still more difficult remained in the rear. An examination convinced me that an attack would be hazardous." The assault here was suspended; but Lee still persisted. He sent to each of his commanders a brief message, each word of which cost him a hundred men: "Batteries have been established to act upon the enemy's lines. If they are broken, as is probable, Armistead, who can witness the effect of the fire, has been ordered to charge with a yell. Do the same." This second attack was to be made by Magruder with 20,000 men, comprising his own division and that of Huger, who had been displaced. Magruder, after a long and weary march, came up, and found that Armistead, of Huger's division, had driven some skirmishers. The Union line was thought to be broken. "It is reported," Lee wrote to Magruder, "that the enemy is getting off; press forward your whole line, and follow up Armistead's success." Hill pressed forward with the others, and in an hour and a half his division, now reduced to 8,000, lost 336 killed and 1,373 wounded. Magruder's attack failed to make any real impression; his men were mown down as they advanced by a terrific fire of artillery and musketry, which cost him some 500 killed and

2,000 wounded. The battle closed when darkness set in. On the confederate side it had been borne almost wholly by the divisions of D. H. Hill and Magruder, together not more than 28,000 strong. Jackson's own division was not fairly engaged, but being within distant range of the Union artillery it lost 41 killed and 363 wounded. Longstreet, A. P. Hill, and Holmes had no part in the battle. The Union loss at Malvern hill was about 375 killed and 1,800 wounded; the confederate loss, 900 killed and 3,500 wounded.—The series of engagements from June 26 to July 1 has been styled the "seven days' battles," although there were really but six days. In all, including skirmishes, the Union loss appears to have been 1,582 killed and 7,709 wounded; that of the confederates nearly twice as great, being 3,150 killed and 15,255 wounded. The former lost also 5,958 in missing, of whom 2,000 were the prisoners at Cold Harbor, and 2,500 in the hospitals at Savage's station; the confederate loss in prisoners was about 1,000. So that the entire Union loss was 15,249; confederate, 19,405. Had McClellan followed up the victory at Malvern hill within the next day or two, the confederate army must have been annihilated. But instead of doing this, during the night following he abandoned his strong position, and retreated to an unhealthy one at Harrison's landing, where he intrenched himself, and pleaded for reinforcements. At first he asked for 50,000, then for 100,000. Three weeks later he said if he could have 30,000 he might attack Richmond with a good chance of success, though he would then have an effective force of only 120,000, while he estimated that of the enemy at 200,000. So matters rested until the middle of August, when the Union army was withdrawn from the region of the Chickahominy and the James, and ordered to the Potomac. After the battle of Malvern hill the confederates remained for a week near the spot, and then returned to Richmond. Lee had accomplished his main purpose of raising the siege of the confederate capital. IX. SECOND COLD HARBOR. In the spring of 1864 the current of the war again rolled toward the Chickahominy. The command of the Union army was given to Grant, who encountered Lee in the bloody but indecisive battles of the Wilderness, May 5, 6; Spottsylvania, May 11; and the North Anna, May 25. All this time the two armies had been verging toward the region where they had contended two years before. On June 2 Lee had taken up his position near Cold Harbor, while Grant was marching toward him from the same direction in which Jackson had marched upon Porter. The confederate position was strongly intrenched. Lee could retreat no further, for behind him was the Chickahominy, now unbridged, and he could not cross it without winning a decisive battle. Grant, whose force was now about 150,000, while Lee had barely 50,000, resolved to attack the enemy in his intrenchments; if

he could be forced from these, he must retreat up the bank of the Chickahominy, pressed by threefold numbers. The plan of attack was simple. Hancock's corps was on the left, then Wright's, then Smith's, massed opposite the confederate right; Warren's corps came next, stretched in a long thin line, which was continued by Burnside's, whose right was flung back. In the gray rainy dawn of the 3d these corps rushed upon the confederate lines. Barlow's division of Hancock's corps, formed into two lines, struck a sunken road in front of the confederate intrenchments, where they met a solid mass of fire and lead, which in a quarter of an hour drove them back, with the loss of a third of their numbers. Gibbon's division, which was next on the right, dashed up to the works, breasting a torrent of musketry, in the face of which they mounted the parapets; but they could go no further, and were soon repelled. Wright and Smith assaulted with like ill fortune, though they maintained the fight for an hour. Warren was only to hold in check the enemy directly in his front; while Burnside, swinging round, was to fall upon the confederate left. He drove in the outposts, but before he could execute the order to attack in force, it was countermanded; for Meade, who commanded in the field, thought the failure of the assault on the left showed that the confederate works could not be carried. The skirmish line was withdrawn, and the corps set about intrenching itself in its position, upon which the confederates made a feeble sortie, which was easily repulsed. With this closed the second battle of Cold Harbor, in which Grant had wholly failed. His loss was severe, probably not less than 7,000 in killed and wounded; that of the confederates being less than half as many.—For ten days longer the two armies lay facing each other on the east side of the Chickahominy, Grant edging to the southward, still hoping to be able to turn the confederate right; Lee at the same time extending his intrenched line in the same direction. A continual series of skirmishing and picket firing was kept up, only interrupted on June 7 by a truce in order to bury the dead. Grant, while making preparations to move his army to the south side of the James river, still hoped that Lee would make some movement which would furnish opportunity for another attack on the Chickahominy. But Lee showed no disposition to move from his intrenchments, which the experience at Cold Harbor had shown to be unassailable. At length on the 12th Grant broke up his position. The bulk of the army marched down the Chickahominy to the James, which was crossed just below the point where McClellan had remained after the battle of Malvern hill. A portion of the army, however, crossed the Chickahominy below the White Oak swamp. Lee, who could only see this part of the movement, supposed that Grant proposed to march up the north bank of the James, and assail Richmond from that side.

He therefore abandoned his position on the east bank of the Chickahominy, crossed the stream, and fell back within his strong lines in front of Richmond.

CHICKAMAUGA, Battle of, fought upon Chickamauga creek, an affluent of the Tennessee river, 12 m. S. W. of Chattanooga, in S. Tennessee, Sept. 19, 20, 1863, between the Union army of the Cumberland, under Gen. Rosecrans, and the confederates under Gen. Bragg. During the summer Rosecrans had moved into southern Tennessee, and on Sept. 9 had taken possession of Chattanooga, from which Bragg had retired on his approach. Rosecrans, supposing that the enemy were in full retreat in Georgia, moved after them; but Bragg, having received large reinforcements, and knowing that Longstreet's division from Virginia was on its way to him, resolved to give battle, with the special purpose of recovering Chattanooga. Both armies were considerably scattered in that mountainous region; but on the 18th the forces on both sides were concentrated on the Chickamauga creek. The main battle was opened on the morning of the 19th, the immediate object of the confederates being to gain possession of the road leading to Chattanooga. The fighting was hot all day, but at its close neither side had gained any decided advantage. During the night Longstreet arrived with a portion of his division, and was appointed to the immediate command on the confederate left, that on the right being given to Polk. Thomas, who commanded on the Union left, was first attacked by Polk, who was repulsed. But in the mean time Longstreet had been more successful, and was hardly pressing the Union right and centre, where Rosecrans commanded in person. Owing to an erroneous order from Rosecrans to Gen. T. J. Wood, a movement was made which left a wide gap in the Union centre. The confederates poured through this, and routed part of Crittenden's and all of McCook's army corps, driving them from the field in utter confusion. Rosecrans, who had fled to Chattanooga, telegraphed to Washington that his whole army was beaten. But on the left Thomas still held his own. He had taken up a strong line, and awaited the coming attack from the whole confederate force. Longstreet, who actually directed the battle, now pressed the whole confederate strength against Thomas, who was outnumbered more than two to one. Assault after assault was made, but each was repulsed; and at half past 5 the attack was abandoned. Thomas then fell back to Rossville; and during the night of the 21st the whole of his command returned to Chattanooga. This battle was a formal victory for the confederates, who retained the battle field, and captured 40 or 50 guns and some thousands of prisoners, mainly wounded. They however gained no real advantage, for Rosecrans still retained Chattanooga, the prize for which the action was fought. The confederate force actually engaged was about

50,000; the Union force was about 55,000, but of this more than 10,000 were isolated early in the day, and took no further part in the battle. In this estimate the cavalry on either side are not included, as they had no scope for action. The Union loss is officially stated at 1,644 killed, 9,262 wounded, and 4,945 prisoners; 15,851 in all. The confederate reports are wanting for about one third of the force, including Longstreet's own brigades, which were most severely engaged. In the two thirds reported, the loss was 1,394 killed, 8,974 wounded, and 882 missing, 11,250 in all; the entire loss being not far from 18,000. A month after this battle Rosecrans was relieved from the command of the army of the Cumberland, which was incorporated with the armies of the Ohio and the Tennessee, and placed under command of Gen. Grant, who on Nov. 23-25, 1863, defeated Gen. Bragg in front of Chattanooga. (See CHATTANOOGA.)

CHICKAREE, a name given, from its loud chattering note, to the red, Hudson bay, or pine squirrel (*sciurus Hudsonius*, Pall.). The body is stout, 7 to 8 inches long, and the tail



Chickaree (*Sciurus Hudsonius*).

rather less, narrow and flat; ears moderate, broad, tufted at the tip. The color above and on the sides is a mixed black and grayish rusty, with a broad wash of bright ferruginous down the back and upper surface of the tail; dull white below; tail rusty at the margin, within which is a narrow black band; there is often a black line on the flanks separating the colors of the sides and belly; soles hairy or naked according to the season. It is found from high northern latitudes to the Mississippi, and throughout the northern and middle Atlantic states in elevated regions. It is active, graceful, fearless of man, cleanly, and industrious in laying up a winter supply of food; it sometimes makes its nest in outbuildings; it is very lively all winter, eating its store of nuts, and the seeds of pines and firs; in cold climates it burrows in the ground at the foot of some large coniferous tree. Its flesh is tender and well-flavored; it is less gentle and easily tamed than the gray squirrel. It much resembles the common squirrel of Europe (*S. vulgaris*, Linn.).

CHICKASAW. I. A N. E. county of Mississippi; area, about 990 sq. m.; pop. in 1870, 19,899, of whom 10,069 were colored. It was ceded to the state by the Chickasaw Indians. The surface is level, and the soil fertile. The Oktibbeha, Looshacoona, and Yallabusha are the principal streams. The Mobile and Ohio railroad crosses the N. E. corner. The chief productions in 1870 were 6,669 bushels of wheat, 478,406 of Indian corn, 16,992 of oats, 36,314 of sweet potatoes, and 8,892 bales of cotton. There were 2,366 horses, 2,193 mules and asses, 4,067 milch cows, 6,911 other cattle, 4,980 sheep, and 25,813 swine. Capital, Houston.

II. A N. E. county of Iowa, intersected by the Wapsipinicon river and its tributaries, and also drained by Crane creek and the Little Cedar river; area, 576 sq. m.; pop. in 1870, 10,180. Prairies and forests occupy most of the surface. The Cedar Falls and Minnesota railroad touches the S. W. corner, and the McGregor and Missouri River railroad passes through the county. The chief productions in 1870 were 417,849 bushels of wheat, 386,723 of Indian corn, 334,521 of oats, 22,762 of barley, 62,462 of potatoes, 34,651 tons of hay, 422,338 lbs. of butter, and 13,426 of wool. There were 3,558 horses, 4,736 milch cows, 7,919 other cattle, 4,830 sheep, and 6,206 swine. Capital, New Hampton.

CHICKASAW BAYOU, Battle of, fought near Vicksburg, Miss., Dec. 29, 1862. Gen. Sherman, who was besieging Vicksburg, finding the city unassailable in front, endeavored to attack it in the rear. He sent a strong force 10 m. up the Yazoo river, which was to land and march down from the north. In the way of this march was the Chickasaw bayou, setting out from the Yazoo, bordered by a broad miry swamp, almost impassable, and guarded by batteries and rifle pits. These were held in such force that all attempts to cross the bayou failed, and the enterprise was abandoned, having cost 192 killed, 982 wounded, and 756 missing. The confederate loss was insignificant.

CHICKASAWS, a nation of American Indians, residing when first known to the whites about 160 m. E. of the Mississippi, between lat. 34° and 35° N. According to their own tradition, they came from west of the Mississippi with the Creeks and Choctaws. When about to start eastward, they were provided with a large dog as a guard and a pole as a guide. As they marched they planted the pole in the ground every night, and in the morning looked at it and went in the way it leaned. They crossed the Mississippi, in which their guardian dog was drowned, and arrived on the Alabama, where their pole, after being unsettled for several days, at length pointed southwest. They proceeded in that direction to what is known as the Chickasaw old fields, where the pole remained perfectly upright. In 1540 De Soto reached Chicaça, one of their towns in what is now the northern part of the state of Mississippi, and wintered there. But

when in the spring he wished to force them to supply men to carry his baggage, they fired their town and attacked him, causing great loss. When the French settled Louisiana the Chickasaws had already been visited by traders from the English colonies, and thus came into the struggle of the rival nations. They had at one time, it is said, 10,000 warriors, but in 1720 numbered only 450, in four large contiguous settlements, Yaneka and Chookka Pharaah (Long House) being the most important. They were divided into five clans or families, Minko, Showa, Coishto, Oushpehne, Minne, and Huscona, and recognized a king or *mico* as head of the nation. They began hostilities against the French in 1722, killing a sergeant and his wife near the Yazoo post. In 1732 they cut to pieces a war party of the Iroquois who invaded their territory, but in 1746 were coöperating with that confederacy against the French. By advice of English traders they urged the Natchez to cut off the French, and after the overthrow of that nation gave a refuge to the remnant who escaped from the vengeance of the French. They then took up arms openly, cut off all trade on the Mississippi river, and joined the desperate Natchez in their raids. They killed the chief of the Tonicas by treachery, and besieged Denys at Fort Nachitoches, but were repulsed there with loss. This led to a war, and in 1736 the French attempted to crush them by a simultaneous attack from the south under Bienville and from Illinois under D'Artaguette. The former retired; the latter took several of the Chickasaw towns, but was defeated and taken at Amalahta with Vincennes, Père Senat, and others, all of whom were put to death. In 1739 a very formidable expedition ascended the Mississippi under Bienville and De Noailles, but they halted near Chickasaw Bluff, and after some skirmishes made a hollow peace with the Chickasaw envoys in August, 1740, though hostilities were kept up in a desultory way for the next ten years. The Chickasaws entered into friendly relations with Gen. Oglethorpe, and seem to have maintained them. In 1765 their head men and warriors, with those of the Choctaws, met Gov. George Johnstone of West Florida in a general congress at Mobile, and established a regular tariff of trade; but troubles were soon caused by grasping traders who had settled among the Chickasaws. After the revolution the United States made a treaty at Hopewell in 1786 with Pio Mico and other chiefs, fixing their territory at the Ohio on the north, and running down into what is now Mississippi. They were then estimated at from 800 to 1,200 warriors, but as their territory was remote from settlements there had been no encroachments or collisions. When the Creeks drove them to war in 1793, they joined the whites in operations against the Creeks, remaining constantly friendly to the settlers, although surrounded by hostile tribes. In 1805, 1816, and 1818 Chenubbe Mico and

other chiefs ceded all their lands north of Mississippi for certain specified annual payments; the Colberts, influential men of the tribe, aware of the value of the lands, securing better terms than usual. The scarcity of game and the narrowing of their hunting grounds had led some of the tribe to emigrate to the Arkansas about the beginning of the present century. In 1822 those remaining in Mississippi comprised 3,625 souls in eight towns, advancing in civilization, owning slaves, and selling cattle and hogs to the whites. When the United States adopted the plan of removing all Indians west of the Mississippi, the Chickasaws, by the treaties of Pontotoc Creek, Oct. 20, 1832, and Washington, May 24, 1834, ceded to the United States all their remaining lands in Mississippi, amounting to 6,442,400 acres, for which they received \$3,646,000. They had determined to settle on lands already assigned to the Choctaws, who speak the same language. By a convention, Jan. 17, 1837, they paid the Choctaws \$530,000 for a district on the Red west and south of the Washita, to be held by them as a tribe and in common, and inalienable except with the consent of the Choctaws. They were also to abandon their government by a king and form part of the Choctaw nation, governed under its constitution, with equal representation. During the emigration smallpox broke out, carrying off 500 or 600 of the tribe. They did not all settle on their new tract, but scattered through the Choctaw country as they found lands to suit them, some wealthy men like Col. Colbert taking up large tracts for cotton, and employing numerous slaves in its culture. As a body they did not advance as rapidly as the Choctaws, their large annuity (\$60,000 among about 4,200) encouraging idleness. They were harassed by some neighboring tribes, and had no schools till an academy was opened in 1851. Their political condition also caused discontent, as, instead of equal representation as they expected, they were allowed only in proportion to population, and were a powerless minority. They appealed to the President of the United States, and on paying \$150,000 to the Choctaws obtained by treaty of June 22, 1855, a political separation from them and a complete title to the Chickasaw district. Here they organized a new government of their own, and have since been recognized as a distinct tribe. Their progress after this was rapid, but the civil war was a severe blow to them. Like the Choctaws, the Chickasaws first joined the south, led by their agents; and though there were no military operations in their district or contest in the tribe, they lost nearly one fourth of their population, much stock, and of course their slaves. By the treaty of Fort Smith, September, 1865, the Chickasaws with other tribes, held to have forfeited all their rights by rebellion, were restored on certain conditions and new treaties made. By another treaty, April 28, 1866, the

United States government reaffirmed all the old treaty stipulations, and the Chickasaws gave up nearly 7,000,000 acres of land at 4½ cents an acre, the money to go to their late slaves unless within two years they accepted them as members of the tribe. The Chickasaws were very loath to lose the money or adopt the negroes, but finally accepted the latter alternative, Jan. 10, 1873. Since the war they have recovered greatly; they have 14 schools and about 500 pupils. Their government consists of a governor, senate, and house of representatives. The lands are still held in common, though by act of Sept. 28, 1872, steps were taken to divide it among the members of the tribe. Their stock has always been individual property. In 1871 they owned 4,500 horses, 15,000 sheep, and 25,000 swine; they had 14,500 acres under cultivation, raising 300 bales of cotton and 380,000 bushels of corn. They receive a perpetual annuity of \$3,000, and have in the hands of government nearly \$1,200,000 in bonds, of which they receive the annual interest.

CHICKEN POX (*varicella*), an exanthematous disease, characterized by the eruption of small vesicles appearing in successive crops. It is confined almost exclusively to children. The eruption is preceded by more or less fever for a day or two; it appears first on the back, neck, and breast, whence it spreads to the face, limbs, and body. The eruption is very early, if not from the beginning, vesicular, resembling drops of water about the size of split peas, the contained fluid being transparent or straw-colored; they sometimes run together, and assume a conical or globular form, which has given rise to the described varieties; they are usually surrounded by slight redness, and accompanied by considerable itching, which causes them to be very soon broken. About the fifth day they begin to dry up in scales, which fall off in a few days, leaving a discoloration and sometimes a slight permanent pitting of the skin. Sometimes the contents of the vesicles become pustular, accompanied by higher and more lasting fever; English writers call such cases swine pox. The Latin name *varicella* is a diminutive of *variola* (smallpox), from the opinion which formerly prevailed that the two diseases were nearly allied, variola, varioloid, and varicella being all considered varieties of smallpox; but chicken pox is now understood to be a distinct affection. It may be distinguished from smallpox by its mildness, vesicular character, and the successive appearance of its eruption; though some severe cases are with difficulty distinguished from mild varioloid. It occurs in persons who have been vaccinated and who have had smallpox, and in those who have not experienced vaccination, varioloid, or variola; though often prevalent at the same time with variola, it has not been known to communicate the varioloid or the smallpox; it is not certain that it can be transmitted by inoculation, and it is generally considered

very slightly, if at all, contagious. It is a disease unattended with danger, unless from accidental complications, and requires no treatment other than attention to diet, mild laxatives, and cooling drinks.

CHICKEN SNAKE, a name given in the northern states to the *coluber eximius* (De Kay), *ophibolus eximius* and *O. clericus* (Bd. and Gd.). The head is short and the snout rounded; the nostrils are lateral, the eyes large, with a dusky pupil and gray iris; the neck is contracted, the body long but robust, covered with smooth, small hexagonal scales above, and with broad plates below; the tail is short, thick, soon becoming cylindrical, and ending in a horny tip. The color, as described by Holbrook, is milky white above, sometimes tinged with red; along the vertebral line is a series of dusky oval spots, bordered with black, sometimes giving the appearance of transverse white and black bands (as described in Storer's report on the Massachusetts reptiles); alternating with these bands on the sides is another series of smaller rounded and blacker spots, and sometimes a third smaller series lower down; the upper lip is



Chicken Snake (*Ophibolus eximius*).

milky white; the abdomen is silver white, sometimes yellowish; each plate marked with one or two black spots, quadrilateral, near the centre if single and near the margin if double, giving a tessellated appearance, whence the specific name *calligaster* given by Say to the western variety; in a specimen 3 ft. long, the head was 11 lines, body 30 in., and the tail about 5 in.; the abdominal plates 198 to 208, and the subcaudal scales 47; it grows to the length of 5 ft. It is perfectly harmless; from its frequenting houses and dairies, it has been called "house snake" and "milk snake." It feeds on frogs, toads, mice, insects, and small birds. It does not appear to be found below lat. 37° N.; westward it extends to the Mississippi; it prefers shady and rocky places; in the southern states it is replaced by *scotophis guttatus*.—The chicken snake of the south is *scotophis quadrivittatus* (Bd. and Gd.); the body is very long; above, a greenish clay color, with four longitudinal brown bands; yellowish beneath; scales on the back ridged, on the sides smooth; the head is quite distinct; the tail is one fifth of the whole length; in a specimen 4½ ft. long, the head was 1½ in., body 3½ ft., and tail 10 in.; 238 abdom-

inal plates and 90 subcaudal scales; it is said to attain a length of 7 ft. It is found from North Carolina southward, and to the Mississippi; it destroys rats, young chickens, and small animals, but its bite is harmless to man; it is sometimes found on trees.

CHICKERING, Jonas, an American pianoforte manufacturer, born at Mason Village, N. H., April 5, 1798, died in Boston, Dec. 8, 1853. He was put to the trade of a cabinetmaker, but early evinced great fondness for music, and successfully readjusted and tuned an old and disused piano which he found in the town. In 1818 he became a workman in Boston in a pianoforte manufactory, and five years later began the business for himself. He extended his resources by a partnership in 1830, but after the death of his partner in 1841 prosecuted the business alone with ample means. His establishment became one of the largest in the country, and he finished annually more than 1,500 instruments, and gave employment to about 500 operatives. His manufactory being burned one year before his death, at a loss of over \$200,000, he commenced a new and magnificent building, which was completed by his sons. Mr. Chickering's improvements, which have given the superiority to American pianos, have been generally adopted in this country and Europe.

CHICLANA, a town of Spain, in the province and 11 m. S. E. of the city of Cadiz; pop. about 9,000. It has a number of country residences belonging to the wealthy inhabitants of Cadiz, the workhouse of that city, a hospital, and a theatre. Near the town, on March 5, 1811, the battle of Barosa was fought between the Anglo-Spanish army under Sir Thomas Graham and the French under Victor.

CHICOPEE, a town of Hampden co., Mass., on the E. side of the Connecticut, at the mouth of the Chicopee river, 95 m. by rail W. S. W. of Boston; pop. in 1870, 9,607. It contains the villages of Chicopee or Cabotville and Chicopee Falls, which are connected by a branch railroad 2 m. long, uniting with the Connecticut River railroad at Chicopee. The town was settled about 1640, and formed the northern part of Springfield, and was set off from that city in 1848. The principal establishments are 7 cotton mills, with 114,208 spindles, 1 woolen mill, 1 manufactory of hollow ware and castings, 1 of locks, 2 of ploughs and other agricultural implements, 2 brass foundries (Ames company), 1 manufactory of military goods, &c., 1 of arms, and 1 brick yard. The chief companies are the Dwight manufacturing company (prints, sheetings, &c.), and the Ames manufacturing company, which makes machinery, bronze cannon, small arms, &c. The bronze doors of the senate wing of the capitol at Washington were cast by this company, as was also Ball's equestrian statue of Washington in the Boston public garden.

CHICORY. See **CHICCOBY**.

CHICOT, a S. E. county of Arkansas, bordering on Louisiana, and bounded E. by the Mis-

issippi river; area, 820 sq. m.; pop. in 1870, 7,214, of whom 5,393 were colored. It is intersected by Crooked and Mason bayous. The surface is level and in some places subject to inundation. The soil in several parts is very fertile. The chief productions in 1870 were 85,462 bushels of Indian corn, 5,092 of sweet potatoes, and 10,187 bales of cotton. There were 449 horses, 988 mules and asses, 1,005 milch cows, 2,073 other cattle, and 2,529 swine. Capital, Lake Village.

CHICOUTIMI, a N. county of the province of Quebec, Canada, intersected by the Saguenay, and containing besides the parishes a large unorganized territory; area, 23,759 sq. m.; pop. in 1871, 17,493, of whom 16,643 were of French origin, and 17,393 Roman Catholics. Much of the surface is rugged and uneven, though recent explorations give a better impression of its agricultural capabilities. The pine forests, which are of immense extent and great value, have been partially worked for several years. Vessels are freighted with timber for England at the town of Chicoutimi, the capital of the county, 75 m. up the Saguenay.

CHICOL. See **USUMASINTA**.

CHIERI, a town of Italy, in the province and 9 m. S. E. of the city of Turin; pop. about 16,000. It has a gymnasium, a polytechnic school, and a collegiate church, which is believed to have originally been a temple of Minerva, with many beautiful paintings.

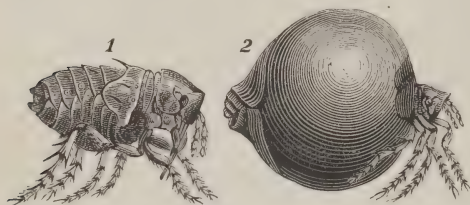
CHIETI, a province of Italy. See **ABRUZZO CITERIORE**.

CHIETI (anc. *Teate Marrucinatorum*), a fortified city of Italy, capital of the province of Chieti or Abruzzo Citeriore, Italy, built on a hill, in the midst of a pleasant country near the Pescara, 96 m. E. N. E. of Rome; pop. in 1872, 23,602. It is the seat of an archbishopric, a high court of judiciary, a civil court, and of many wealthy families. The city contains five churches, a military hospital, a college and a religious seminary, several monasteries, wool and silk manufactories, and carries on a trade in the produce of the country. There are remains of a large theatre, some ruined temples, a gateway, and a mosaic pavement.—The ancient Teate was the capital of the tribe of the Marrucini, and was one of the principal towns of this part of Italy. It joined the Samnite league, after the fall of which it was held successively by the Romans, Goths, Lombards, Franks, and Northmen. The order of Theatines or Chietines took its name from this place, its founder, Paul IV., having been archbishop of Chieti. It was taken by the French in 1802.

CHIGI, a family of Roman prelates and princes, who are hereditary marshals of the conclave. They originally came from Siena, where the Chigi-Zondadavi branch still exists. **FABIO** (1599–1667) became pope under the name of Alexander VII. and vastly increased the wealth and influence of his relatives, the magnificent Chigi palace and the extensive Chigi library in Rome still perpetuating the

memory of the family. They subsequently added the family name Albani of Pope Clement XI. to their own. The present head of the Chigi-Albani princes is Don SIGISMONDO, born Aug. 24, 1798. FLAVIO, a brother of Prince Sigismondo, and the present papal nuncio in Paris, born in 1810, was in 1848 an officer of the pope's body guard of nobles, and afterward took holy orders. On being appointed papal representative at the coronation of Alexander II. of Russia (Sept. 7, 1856), he received the title of archbishop of Mira *in partibus*. He was subsequently nuncio in Munich, and on Jan. 23, 1862, he was accredited in the same capacity in Paris.

CHIGO, a species of flea (*sarcopsylla penetrans*), called also jigger and sand flea, found in the West Indies and the tropical regions of South America. It inhabits the sand and chinks in the stalls of animals, and it is only the impregnated female that is found on man. She bores deeply into the skin of the feet in order to deposit her eggs, and as soon as an attachment is obtained, her hindmost segment swells up in a wonderful manner beneath the skin, so that the thorax and head appear as appendages to a bladder often as large as a pea. This sac contains the eggs or larvæ,



1. Chigo, magnified. 2. Chigo gorged with blood.

about 60 in number, which, if the sac be broken during removal, are scattered through the tissues, and give rise to troublesome ulcers, which may necessitate amputation. Its removal unbroken may be effected with a needle, as soon as the swelling takes place. The negroes, and others going without shoes and stockings, are liable to suffer from this insect; and some of them acquire much dexterity in its removal. The best preventive is cleanliness and the constant wearing of shoes.

CHIHUAHUA. **I.** A N. state of Mexico, bounded N. by New Mexico and Texas, E. by Coahuila, S. by Durango, and W. by Sinaloa and Sonora, between lat. $26^{\circ} 30'$ and $31^{\circ} 45'$ N., and lon. $103^{\circ} 50'$ and $108^{\circ} 40'$ W.; area, 105,295 sq. m.; pop. 180,000. A prolongation of the Sierra Madre covers the western portion of the state, the mountains being in some parts little short of 180 m. in breadth. The mountain passes and fastnesses are frequented by savage Indians. The plains maintain an average elevation of from 4,000 to 5,000 ft., while the mountain systems by which they are traversed rarely rise to a greater altitude than 1,000 ft. above them, until by a gradual slope upward

the Sierra Madre is reached, some of the peaks of which attain 8,000 ft. The Rio Grande del Norte serves as the dividing line with the United States. The Conchos and the Verde are the other important rivers. The soil, especially in the northern districts, is in general stony and unfavorable to vegetation. But the valleys are very fertile, and support large herds of cattle; and the region bordering the eastern slope of the Sierra Madre is well watered, and is reputed to possess the richest soil in the state. The vine is cultivated with some success; cotton is raised, though to no considerable extent; and the chief resources of the people are their cattle, sheep, horses, and mules, all of which they export in large numbers. Gold, silver, copper, iron, tin, lead and other minerals abound, especially silver, for which the Chihuahua mines have been celebrated for centuries. The most productive silver mines were those of Batopilas, Jesus Maria, and El Parral, in the Sierra Madre, and those of Sta. Eulalia, in the plain a few miles distant from Chihuahua city. The region adjacent to the boundary line with the state of Sonora is interesting as the site of extensive ruins. (See CASAS GRANDES.) Wild animals abound, including black and grisly bears, the buffalo, the elk and other deer, the puma, ounce, and wild boar. The state is infested by tarantulas and scorpions, and there are four species of serpents. **II.** A city, capital of the state, and of a district of the same name, situated at the base of the Sierra Madre, in a beautiful plain, 800 m. N. W. of Mexico, in lat. $28^{\circ} 35'$ N., lon. $105^{\circ} 30'$ W.; pop. about 12,000. The most noteworthy public edifices are the magnificent cathedral, situated in the Plaza Mayor, constructed of hewn stone, at a cost of \$800,000; the mint; the prison, formerly a convent of the Jesuits; and the handsome aqueduct by which the city is supplied with water. In the Plazuela de San Felipe is a monument commemorative of the execution on the same spot of the first heroes of Mexican independence; and there are two hospitals, a house of correction, a military and several other schools. Chihuahua was founded in 1691, and erected into a town in 1718, when it is said to have had over 70,000 inhabitants.

CHILBLAIN, an atonic inflammation or chronic engorgement of the skin and subcutaneous or cellular tissue, caused by sudden alternations of temperature, generally by exposing the hands and feet when benumbed with cold to too great heat. As it usually appears, the skin is reddened and somewhat swelled, painful on pressure, with considerable tingling and itching. It is most frequently seen on the toes, heel, and ball of the foot, and appears only during the winter season. The treatment consists in stimulating lotions, such as salt and water, or tincture of iodine.

CHILD, Sir Josiah, an English merchant, born in London in 1630, died there in 1699. He was for some time chairman of the East India company, and wrote several papers, without

signature, in defence of the traffic with the East. In his essay on trade he advocated the compulsory emigration of paupers to the colonies. His principal work is entitled "Brief Observations concerning Trade and the Interest of Money, by J. C." (4to, London, 1668). An enlarged edition was published in 1690, under the title of "A New Discourse on Trade." The work has been several times reprinted. It was written in defence of the reduction, by legal enactment, of the rate of interest on money from 8 to 6 per cent., and recommends a further diminution to 4 per cent. Charles II. made him a baronet. His son became Viscount Castlemaine and Earl Tylney, but the peerage expired with the second earl.

CHILD, Lydia Maria, an American authoress, born at Medford, Mass., Feb. 11, 1802. Her father, David Francis, was a baker. In 1824 she published her first book, "Hobomok, an Indian Story," which was followed the next year by "The Rebels, a Tale of the Revolution." The scene was laid in Massachusetts, and some of the characters were the historical men of that period. The book for several years held its place as a standard novel, the times and the events with which it dealt giving it a strong hold upon the popular esteem. A speech which she put into the mouth of James Otis was believed by many to have been actually delivered by him. A sermon of Whitefield's was also given, which was inserted in the New England school reading books as a genuine sermon of the great preacher. In 1826 she commenced the "Juvenile Miscellany," a monthly magazine, which for eight years was under her management. She published a cookery book, under the title of "The American Frugal Housewife," which later publications upon the same subject have not displaced. In October, 1828, she was married to David Lee Child, a lawyer of Boston. "The Girls' Own Book" and "The Mothers' Book" (1831) testified to her strong interest in practical education. About this time the anti-slavery movement was commenced in Boston, and Mrs. Child identified herself with it at the beginning. One of the first distinctive anti-slavery books was her "Appeal in behalf of that class of Americans called Africans," in which she advocated the immediate emancipation of the blacks. This is her largest and most comprehensive work upon the subject of slavery; but it was followed in subsequent years by various smaller publications of a similar character. In 1836 she published "Philothea," a Grecian romance of the time of Pericles and Aspasia. In 1841 she removed to New York to take charge as editor of the "National Anti-Slavery Standard," of which she remained editor, assisted by Mr. Child, for two years. In its columns she commenced a series of "Letters from New York," which, with others written subsequently, were collected in two volumes (1843-'4). She afterward published "History of the Condition of Women in all Ages and

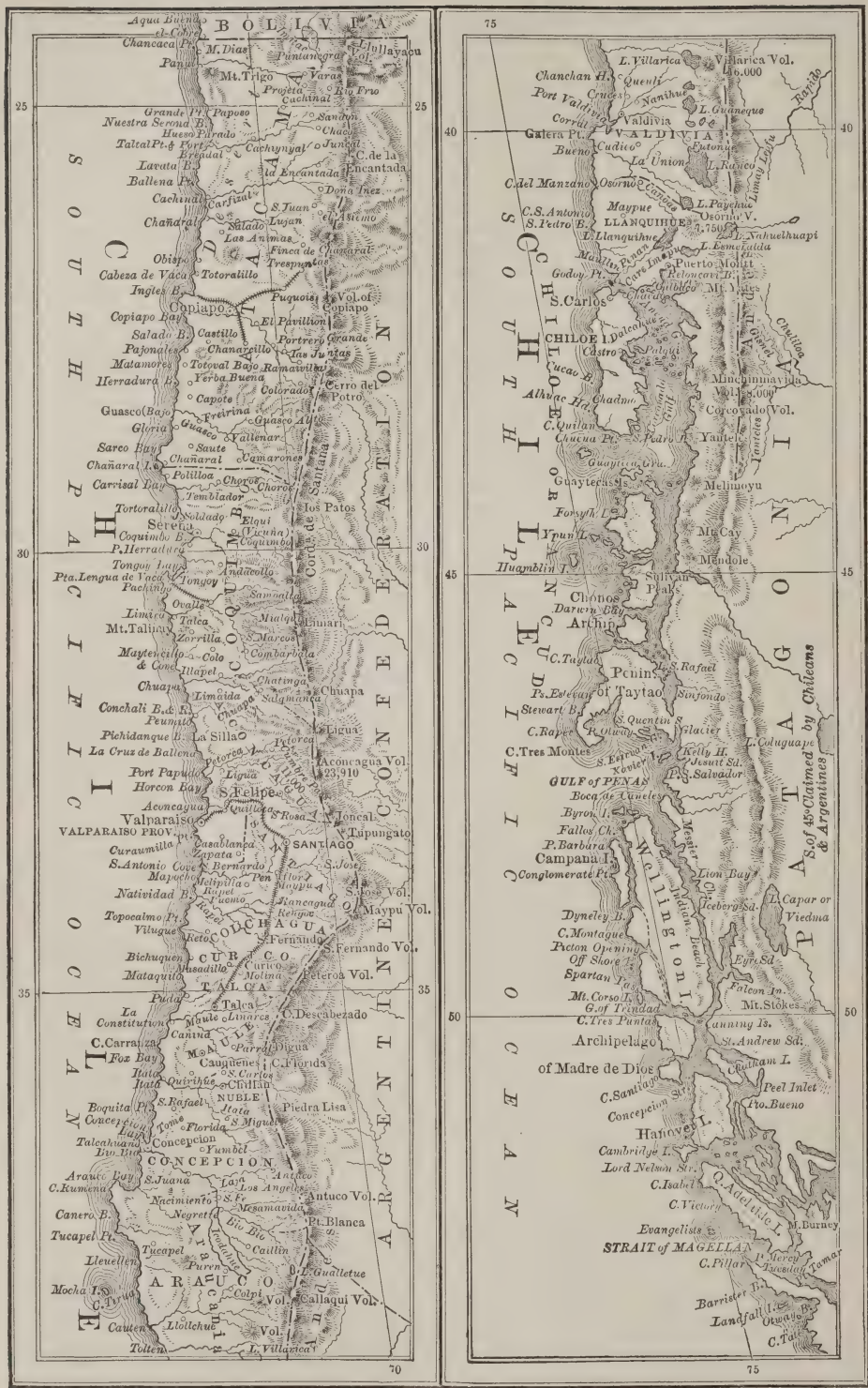
Nations" (2 vols., 1845), "Biographies of Good Wives" (1846), and several volumes of stories for children. In 1859 she wrote a letter of sympathy to John Brown, which involved her in a correspondence with Gov. Wise and Mrs. Mason of Virginia. This correspondence was published in a pamphlet of which 300,000 copies were circulated. Her other works are: "Life of Isaac T. Hopper" (1853); "Progress of Religious Ideas" (3 vols., 1855); "Autumnal Leaves" (1857); "Looking toward Sunset" (1860); "The Freedman's Book" (1865); and "A Romance of the Republic" (1867).

CHILDBIRTH. See OBSTETRICS.

CHILDEBERT, a Merovingian king of the Franks, the third son of Clovis and the second of Clotilda, born about 495, died in 558. On the death of his father in 511 he became king of Paris as his share of the patrimony, while Clodomir became king of Orleans and Clotaire king of Soissons. In alliance with his brothers he participated in the conquest of Burgundy, and subsequently successfully conspired with Clotaire to usurp the kingdom of their brother Clodomir, who had been killed in the Burgundian war. He afterward made some conquests in Spain. On his return he quarrelled with Clotaire and made war on him; but before the contest ended he died, and having no male heir his kingdom fell to Clotaire. Two other Merovingian Chilberts are to be found among the *rois fainéants*.

CHILDREN, John George, an English electrician, born at Ferox Hall, Tunbridge, May 18, 1777, died Jan. 1, 1852. He was educated at Cambridge for the church, but his wife dying, he travelled for some time in the south of Europe and the United States, and then devoted himself wholly to scientific pursuits. In 1808 he published in the "Philosophical Transactions" an account of a series of experiments confirmatory of Davy's view that electric intensity increases with the number of voltaic plates, and the quantity of electricity with the extent of surface. In 1815 he continued the subject in the "Philosophical Transactions," relating among other interesting results the conversion of iron into steel by union with diamond. Subsequently he discovered a method of extracting silver from its ore without amalgamation. Besides the papers above mentioned, he published translations of Berzelius "On the Blowpipe," and Thénard "On Chemical Analysis;" he also assisted to establish and edit the "Zoological Journal." He was for some years secretary of the royal society, and one of the librarians of the natural history department in the British museum.

CHILI, or **Chile**, a republic of South America, lying W. of the Andes, between lat. 24° and 56° S., and lon. 70° and 74° W. It is bounded N. by Bolivia, E. by the Argentine Republic and Patagonia, S. and W. by the Pacific ocean. These limits include that part of Patagonia W. of the Andes and S. of lat. 43° 20', over which the jurisdiction of the Chilean government is



at present merely nominal. The area, exclusive of Patagonia, is about 133,000 sq. m.; including it about 250,000 sq. m. The surface is greatly diversified. Besides the Andes, which form its E. border, there are two other ranges, of less elevation, which traverse portions of the narrow strip between the Andes and the Pacific, commencing near the 33d parallel. The more easterly of these is known as the central chain; it terminates on the Pacific, opposite the N. end of the island of Chiloe. The other, known as *la cordillera de la costa*, or the coast range, separating from the central near its origin, follows more nearly the line of the coast. It is of lower elevation than the central range, and is in some parts arable. Besides these mountain chains, there are multitudes of isolated hills. The principal valley of the country is that between the central chain and the Andes. The mean elevation of the mountains of Chili is from 13,000 to 14,000 ft. The most of them are now, or have been at some former time, volcanic. The highest peak, Aconcagua (22,422 ft., according to Pissis), shows no sign of modern igneous action; but Llullaillaco (21,000), Villarica, San José (18,150), Peteroa, Llayma, Antuco, Hanahue, Chillan, Calbuco, Corcovado, Osomo, Yantés, Minchinmadom, and several others, are, or have been within a late period, active volcanoes. Besides these, the following, which are not volcanoes, are remarkable for their elevation: Cerro del Mercedario (22,305 ft., Pissis), Tupungato (21,413, Pissis; 22,450, Gilliss), Cerro de la Ramada (20,824, Pissis), Joncal (20,368, Gilliss), Cerro del Plomo (17,825), Maypu (17,664), Cruz de Piedra (17,126), San Francisco (16,998), Cordillera de la Laguna (15,575), and Descabezado (13,100). In the northern portion, the coast and central Cordilleras spread out into the elevated plateau known as the desert of Atacama, which rises rapidly from the coast to a height varying from 4,000 to 10,000 ft., and from the comparatively level surface of which shoot up mountain peaks of great elevation, and often volcanic. There are 10 passes across the Andes, from the Argentine Republic: 1, from Antofagasta in Catamarca, through the Portezuela de Come Cavallo, to Huasco and Copiapó, about 14,500 ft. above the sea; 2, from San Juan, over the Portezuela de la Laguna, to Coquimbo, 15,575 ft.; 3, pass of Los Patos, on the N. side of the Aconcagua; 4, the pass of La Cumbre, from Mendoza, by way of Uspallata to Santiago, 445 m., 12,530 ft., passable from November to May; 5, the Dehesa pass, near Tupungato, seldom used; 6, the Portillo pass, much used from the beginning of February to the end of April, from Mendoza to the valley of the Maypu river; 7, the pass of La Cruz de la Piedra, leading into the Portillo road on the western slope of the Andes; 8, the pass of Las Damas (highest point 11,600 ft.), 9, the Planchon pass, along the Claro and Teno rivers to Curico, 6,600 ft., which has been surveyed

for a proposed railway across the mountains; 10, the pass of Antuco, on the road from Concepcion. A new pass has recently been discovered by Germans travelling from Chili to Patagonia.—Chili belongs to the basin of the Pacific, excepting the valley of Uspallata, the waters of which flow toward the Atlantic. The rivers are all of inconsiderable length, but when swollen by the melting of the snows they discharge large amounts of water, and of alluvium, into the Pacific; and almost all of them have in consequence considerable bars at their mouths. The Biobio rises in an extinct volcano in the extreme E. of the Andes, lat. 38° 15', and takes a general N. W. direction, and after a course of about 200 m. falls into the Pacific at Concepcion. It has a sand bar at its mouth, which prevents vessels of any considerable draught of water from ascending it; but it is navigable as far as Nacimiento, nearly 100 m. The Maule rises in the Andes, in lat. 35° 10', and has a nearly due W. course of about 150 m.; it is navigable for small craft about 70 m. The Valdivia rises in Lake Guanegue, in lat. 39° 45', and has a W. S. W. course; its length is about 100 m., and it is navigable for 50 m. The other considerable streams, few of which are navigable, are the Imperial, the Tolten, the Bueno, the Itata, the Maypu, the Rapel, the Aconcagua, the Mataquito, the Limari, the Coquimbo, the Huasco, and the Copiapó. The last is often dry in summer.—Chili has numerous lakes, particularly in the southern provinces, but few of them are large. In some near the coast the water is brackish, but the most of them are bodies of fresh water, accumulated in the elevated valleys. They all abound in fish. The largest of the fresh lakes are Llanquihue, in the province of the same name, and Villarica, in the province of Valdivia, the former of which is 30 m. long and 22 in its greatest breadth. Villarica covers more than 100 sq. m. Todos los Santos or Esmeralda, and Rupanco, in the same plain, are respectively 18 and 24 m. long. In the province of Concepcion are Guilettue, with a surface of about 50 sq. m., and La Laja, celebrated for its picturesque scenery and the beautiful fall at its outlet.—There are few good harbors. The best is that of Talcahuana, which is well protected, and with ample room and depth of water. Coquimbo is the next harbor in point of safety. The harbor of Valparaiso though exposed, is the most important on the Chilean coast in the extent of its commerce. The other principal harbors are Caldera, the port of Copiapó, lat. 27° S., from which the largest exports from the silver and copper mines are shipped; Constitucion, within the mouth of the river Maule, Valdivia, an excellent harbor for small vessels; and San Carlos, on the island of Chiloe, lat. 41° 51'.—Of the numerous islands belonging to Chili, the most important are those of Chiloe and its archipelago, more than 60 in number, of which 30 are settled and have harbors. They abound in seals, otters, and

shell fish, and are well supplied with wood and water. (See CHILOE.) Southward of these are the Guaytecac group and Huafo, similar in their general character. On the coast above Chiloe are several smaller islands, the principal of which are Mocha, lat. $38^{\circ} 23'$, Santa Maria, lat. $37^{\circ} 3'$, and Quiriquina, in the mouth of Concepcion bay, all of which have within the past 100 years met with extraordinary physical changes, from the earthquakes so common on the coast. The most famous of the Chilean islands is the group called Juan Fernandez. (See JUAN FERNANDEZ.)—The climate of Chili is one of the finest on the globe. Being in the south temperate zone, its summer answers to our winter, December, January, and February being the hottest months. During three months little or no rain falls, and the thermometer sometimes rises to 90° or 95° F.; but the sea breeze at night cools the earth, and renders the temperature refreshing. The mean temperature of the winter months at Valparaiso is 54° , at La Serena 54.8° , at Santiago 49° , at Valdivia 46.8° . The highest temperature known at Santiago is 90° , the lowest 47.5° . At Valparaiso the highest mean point in summer in three years' observation was 78° , the lowest 62° , and the annual mean 70.8° . At Coquimbo the mean summer temperature was 63.6° , and the entire range only 16.8° . At Concepcion the mean summer temperature at 3 P. M. was 73.5° , the mean for the year about 56° . In Valdivia the mean summer temperature is 60° , that of the year 55° . At Santiago the average number of hours during which rain fell in the year, during 26 years' observation, was $215\frac{1}{2}$, or about 9 days. Further south the quantity of rain is somewhat greater. Toward the north, on the contrary, the rain diminishes in quantity, and on the desert of Atacama seldom or never falls. As a result of this equable and uniform climate, trees, fruits, and flowers of both tropical and temperate regions flourish well. "The native palm and pine of Araucania," says Lieut. Gilliss, "the cherimoya of tropical America and the medlar of Japan, the magnolia of Florida and the olive of Asia, may all be found within the compass of a garden, not less luxuriant in their proportions and ever verdant foliage than under the climes of their origin." The atmosphere is remarkably clear, especially at night. It is estimated that a $6\frac{1}{2}$ -inch achromatic telescope at Santiago is fully equal to a $12\frac{1}{2}$ -inch one at the Cape of Good Hope. The crescent of Venus was more than once seen with the naked eye by Lieuts. Gilliss and Macrae. There are two drawbacks to this delightful climate, the violent winds and hurricanes which occur at some seasons, and the earthquakes. During the summer months northerly winds, known as *temporales*, occasionally blow in violent gusts, sometimes for two or three days, and are then followed by several weeks of pleasant weather. There is usually a fresh breeze from the S. W. between the hours of

10 and 3 in the day during the summer, and the force of this breeze on the mountains is terrific. The climate, though so delightful, seems to predispose the inhabitants to apathy and indolence. The Chileans are not a long-lived people; pulmonary diseases, affections of the heart and liver, and epidemic dysentery prove fatal to great numbers, and reduce the average duration of human life there to a lower point than in more variable climates. How far these diseases may be dependent on other causes than climate is difficult to ascertain.—Chili may with propriety be called the land of earthquakes, for it is probably visited by more than any other known region of the earth. The inhabitants have two words by which they designate the phenomena: *temblores*, slight and partial agitations of the surface, and *terremotos*, or violent upheavings and oscillations. The *temblores* are so frequent as to pass unnoticed. The record of 25 months' observation at La Serena, in the province of Coquimbo, between 1849 and 1852, shows 156 shocks in that period, though the great earthquake of April, 1851, and the repeated shocks which followed, were not included. Of these not more than two or three could be put down as *terremotos*. At Santiago, in 32 months, there were 130, of which four were very severe. The number increases in a rapid ratio as the observer proceeds northward, though in general those of central Chili are most severe. Of the great earthquakes, 16 of peculiar severity are recorded, in nearly all of which there was considerable destruction of life and property. In that of 1570, which destroyed Concepcion, 2,000 persons perished; and in that of 1647, which destroyed Santiago, 1,000 persons and 60,000 head of cattle. The great earthquake of 1730 destroyed Valparaiso, La Serena, Concepcion, Coquimbo, and every village on the coast between Concepcion and Coquimbo, and in Santiago over 100 persons lost their lives. In 1835 Concepcion was a fourth time destroyed, and Talcahuana, Los Angeles, Yumbel, Cauquenes, and Constitucion were levelled, and about 200 persons were killed; in 1837 the city of Valdivia was destroyed; and in 1851 a great number of persons and churches were injured at Santiago, Valparaiso, and many of the intervening villages. In 1871, March 25, occurred a very severe shock, by which much property was destroyed at Valparaiso and Santiago, but no lives were lost.—The topographical structure of Chili implies the continuation of similar geological formations in a N. and S. direction, following the range of its mountain chains. The belt of country between the Andes and the coast, ranging from 80 to 100 m. in width, is traversed, S. of lat. 32° , by numerous longitudinal ridges, called the Cordilleras of the coast, which are granitic. Further N. these spurs are more irregular in their direction, and are covered in great part with barren sands, showing no trace of vegetation. This northern

portion is of importance for its valuable mines, while a strip along the S. coast, from Concepcion to the island of Chiloe, contains the principal mines of bituminous coal worked in South America. The country between the Andes and the coast is particularly interesting to geologists for the evidences it presents of several successive elevations which it has experienced within modern times. Some of these are historical, as that of 1822, when the coast at Valparaiso, and for many leagues N. and S. of it, was uplifted about 6 ft. The bed of shells and sea pebbles which marked its former beach is now that distance above the reach of the highest tides; and a succession of similar collections of shells of species belonging to the coast, accompanying terraces found further inland, and at higher levels, indicate as many as five uplifts of this character, but of much greater height, the difference of level between two terraces being found 120 ft. and between the next two 182 ft. Around the bay of Coquimbo these terraces are most distinctly marked in the hills; and as they extend back into the country they spread out into plains, upon which the towns are built. Near Valparaiso comminuted sea shells of living species are found at elevations of over 550 ft.; and some, it is stated, have been met with even 1,300 ft. above the sea level.—Chili abounds in mineral wealth. Among the metals are gold, silver, copper, lead, tin, iron, zinc, nickel, cinnabar, cobalt, antimony, bismuth, manganese, and arsenic. The copper and silver mines are probably the richest in the world, and gold exists in very considerable quantities. The principal mining region is in the north, chiefly in the province of Atacama, but rich deposits are continually discovered in the different mountain ranges further south. Copper exists along the course of the granitic and metamorphic rocks of the coast range and western spurs of the Andes, from Santiago to the northern extremity of the country, and beyond into Bolivia and Peru. The region about Copiapó has been worked the longest, and many new mines are opened there every year. Rich deposits of silver and copper have lately been discovered in the province of Coquimbo. Copper is the chief mineral product, the annual value of the exports being over \$12,000,000. The other metals, though abundant, are little sought after. Cinnabar was once mined to some extent, but its importance is now greatly reduced by the cheaper production of quicksilver in California. Besides the metals, Chili contains other valuable minerals. Sulphur, salt, nitre, and alum are plentiful, gypsum and limestone abound, and a fair quality of bituminous coal, of a dull black color, is found near Concepcion and at other points along the coast. These coal beds were known as early as 1825. In 1841 the formation was traced between Talcahuano and Valparaiso, and mines were soon after opened at the former locality. The coal has

also been found in abundance near the mouth of the Laraquita, and the beds are visible in the cliffs from vessels sailing along the coast. New mines have been opened lately along the gulf of Arauco, and large deposits have been discovered in Cobquecura. The most productive mines are in the districts of Coronel and Lota, the latter 30 m. S. of the Biobio, in the province of Concepcion. The coal beds are contained in strata supposed to be of the tertiary formation; and though the coal of this age is never so good as that of the true coal measures, that of Chili is found to answer for steam and domestic purposes; it is considered unsuitable for smelting copper ores. By analysis specimens of this coal afforded 67.62 per cent. of carbon, showing a decided superiority over the ordinary brown coal of the tertiary. Reports of examinations of other coals of the region represent, however, a percentage of carbon not exceeding 40, and the presence of much iron pyrites. The most noted mineral springs are those of Apoquindo, Colina, Cauquenes, Panimavila, Mondaca, Cato, Soco, and Doña Ana; the principal constituents of which are chloride of calcium, chloride of sodium, chloride of magnesium, and sulphates of soda and lime, with occasional traces of iron and alumina. About 75 m. E. S. E. of Chillan hot sulphur springs are found almost up to the line of perpetual snow on the Nevado de Chillan. They are much frequented, and are reputed to possess extraordinary medicinal virtues.—A large part of the soil of Chili is unproductive. The extensive portions of its surface covered by lofty and precipitous mountains, too cold for vegetation, or too scantily covered with earth to sustain it; the deserts of the north, where rain never falls; the large tracts covered by the primitive forest; and the districts inhabited by warlike Indian tribes, must all be deducted from that fit for cultivation; and the remainder forms but a small fraction of the area. Yet the soil, when capable of tillage, is so fertile and yields crops so abundant, that Chili exports very considerable amounts of cereals and meats. Of its provinces, Atacama and Coquimbo do not produce a sufficiency of grain or cattle for home consumption; but the others not only supply themselves and these, but raise a large surplus. The principal grains are wheat, barley, oats, and maize; rye does well, but is not raised because there is no demand for it. Superior hemp is produced in the country north of the Maypu. Beans are a very large and important crop, and peas are extensively cultivated. In the southern provinces potatoes of excellent quality are produced. Fruits abound, including apples, pears, peaches, oranges, limes, nectarines, plums, apricots, figs, grapes, and cherries. Melons, squashes, and gourds also grow to perfection. In the south of Chili a profuse vegetation prevails. The sides of the mountains are covered with herbaceous plants and with flowers of the richest hues, and dense forests abound. This verdure

lasts only about five months, from May to October; at other times the country has a barren appearance, and furnishes an inadequate supply of food for cattle, so that beef and mutton are of inferior quality. In the southern provinces large quantities of timber, valuable for building and ornamental purposes, are produced. Evergreens attain a gigantic size. The araucaria, a species of pine, the alerce, a cypress with a dark rich heart-wood, the roble, tiqui, mañu, muerno, and mayten are all valuable and durable woods. The coligue, a species of bamboo, is in very considerable demand for thatching roofs.—The animals of Chili are not as numerous as those of the countries east of the Andes. The mammals are comparatively few. Claude Gay, the eminent naturalist, enumerates seven species of *cheiroptera*, mostly of the bat tribe; 12 of *carnivora*, embracing four of the cat tribe, three foxes, one weasel, two polecats, the nutria, and the otter; six species of the *phocidæ*, embracing the seal and his congeners; one marsupial, the *didelphys elegans*, peculiar to Chili; 12 genera and 25 species of rodents, of which 12 belong to the mouse family; the chinchilla and its congeners, and the cavy or mountain rabbit. There are only two species of the *edentata*, the dasypus and pichiciego, the latter a very rare animal, found only in Chili. There are three ruminants, the guanaco, the largest of the llama tribe, and two of the deer tribe, the pudu and the gümul. There are four species of *cetacea*, two dolphins, the sperm whale, and the right whale. There are 11 species of *reptilia*, five of which are saurians, four ophidians, one frog, and one toad. The birds are more numerous. The *raptores*, embracing the condor, the vultures, hawks, and owls, are largely represented. The great order of *incessores* has numerous representatives of its every tribe and family, many of them of superb plumage, and some of wonderful powers of song. The dove and pigeon tribes are also found in considerable numbers, and the waders (*grallatores*) and swimmers (*natatores*) are almost numberless, several of the species being peculiar to the western coast of South America. Among the fishes, there are three species of the perch tribe, all new; one of the *atherinidæ*, the kingfish; three of the *siluridæ*, one a new genus; two *clupeidæ*, both new, one a new species of the shad; one *cheirodon*, a new genus of the *characini* family; and a new myxinoïd, having an affinity with the lamprey eel of our northern waters. Crustaceans and mollusks are abundant, especially in Chiloe and the other southern provinces, but have not been very fully examined. The chonos, a peculiar species of oyster, exists in great quantities along the coast, and forms a favorite dish. Among the domestic animals, cattle are raised in large numbers. The horses are hardy and capable of great endurance. Mules and asses are excellent. Sheep, goats, and hogs abound, but are of poor quality.—

Chili is divided into 15 provinces and one colony. The following table shows the estimated area and population of the provinces, exclusive of Patagonia, in 1870:

PROVINCES.	Area.	Population.
Aconcagua	6,000	134,178
Arauco	13,800	87,677
Atacama	88,000	88,343
Chiloe	9,050	62,938
Colchagua	3,900	158,096
Concepcion	3,600	155,382
Coquimbo	13,300	159,698
Curicó	3,000	100,200
Llanquihue	8,350	43,342
Maule	6,400	211,567
Nuble	3,700	125,819
Santiago	7,800	374,078
Talca	8,600	107,412
Valdivia	10,700	27,980
Valparaiso	1,670	144,954
Colony of Magellan	?	729
Total	182,870	1,972,488

The foreign population numbers about 25,000, of whom over one half belong to the Argentine Republic and other neighboring states. The remainder are chiefly English, Germans, French, Americans, Spanish, Portuguese, and Italians, with a few Chinese. Santiago, the capital, had in 1865 a population of 115,377; Valparaiso, 70,438; Talca, 17,900; Concepcion, 13,958; La Serena, 13,550; Copiapó, 13,381; Chillan Nuevo, 9,781; and San Felipe, 8,696. In the above estimate of the total population, the warlike aborigines, nominally under the jurisdiction of Chili, are not included. They are supposed to number about 75,000. These alone, of all the American tribes who came in contact with the Spanish or Portuguese invaders, have maintained their independence, notwithstanding a war of extermination was waged against them for a century and a half. (See ARAUCANTAINS.) Of the other inhabitants of Chili, the Chilenos, as they call themselves, not more than a third, and perhaps not more than a quarter, are of pure Spanish descent; the greater part are of mixed blood, as their forms, features, and hair testify. South of the Biobio there are considerable numbers of Indians who have been reduced to subjection, and are employed as peons or farm laborers, and sometimes, though rarely, as *inquilinos* or tenants on the *haciendadas* or large farms of that region, rendering a kind of feudal service, and making their payments of rent in labor or in kind. The Chilians are more enterprising than the inhabitants of most of the South American states, and the *hacendados* (planters) and merchants often accumulate large amounts of property. With the exception of those destined for the learned professions, they have generally but little education. The men are usually slender, and to the casual observer appear wanting in muscular development; but Lieut. Gilliss affirms that they possess much more strength than the men of other nations. The women, who are generally pretty, have fuller and rounder figures, and seem to have more intelligence

than the males. The dress of the Chilians of the higher classes is in the French style, except that the poncho (a blanket, with a hole in the centre for the head to pass through) is in universal use with both rich and poor. The ladies also copy the French fashions, except in a constant use of the shawl, both indoors and out. The poorer classes dress more like the *gauchos* of the eastern states of South America. In manners they are gay, social, hospitable, and generous, but retain in some degree the bigotry and indolence of their Spanish ancestry. Crimes are of comparatively rare occurrence, but gambling is an almost universal passion. The *chicha*, a fermented liquor made from grapes, green apples, and other fruits, and very intoxicating, is a constant drink, and often inflames the passions of the lower classes and the Indians to fury. Licentiousness exists to an alarming extent, and the diseases it engenders are among the most fatal in the country. Illegitimacy is common. In Santiago a fifth, and in Valparaiso a quarter of all the births are illegitimate. Blindness and goitre are very common. The religion of Chili is Roman Catholic, and the laws tolerate no other; but in practice there is no very marked opposition to the quiet performance of worship under other forms of faith.—Within a few years the government has devoted much attention to the subject of education, and now no other South American state has so efficient an educational system. New schools and colleges have been established, and a strong effort has been made to extend their benefits to all classes. There are now more than 500 government schools, and as many municipal, private, and monastic, with an aggregate attendance of nearly 40,000 scholars. The books for the government schools are furnished by the republic. There are two normal schools for the education of teachers, one for males, the other for females. The national institute at Santiago, which is the government university, is divided into two sections, the preparatory and the university. The preparatory section has two courses, that of the humanities, occupying six terms, and that of mathematics, occupying five. Instruction in both sections is free. Another institution, called the conciliar seminary, combines the college and theological seminary. There are also at the capital a school of agriculture, a naval school under the direction of the minister of marine, and a military school under the care of the minister of war. The national library, also at the capital, contains about 25,000 volumes, and is especially rich in theological works, having been originally founded by the Jesuits.—The agriculture of Chili is very primitive. With the exception of a tolerably skilful system of irrigation, the farmers and planters are grossly ignorant of the improved methods. Their ploughs are rude instruments, only scratching the earth to the depth of two or three inches. The yoke is fastened to the horns instead of the neck of the

cattle. Of subsoiling, the application of manures, underdraining, and rotation of crops, they know nothing; and the stubborn adherence of the peons to old methods handed down from one generation to another is a barrier to any considerable improvement. Still, with all these drawbacks, so fertile is the soil, and so much is it enriched by the detritus brought down by the mountain streams, that agriculture is a very profitable pursuit. The farms are usually very large, frequently comprising several thousand acres; and herds of cattle 5,000, 10,000, or 20,000 in number are pastured on the elevated plains, and tended by the *gauchos*, till the period for their slaughter arrives. The *haciendados* usually reside in the cities, leaving their plantations under the care of mayordomos or overseers, and only visiting them occasionally. Smaller estates are called *chacaras* *haciendas* and also *haciendas*, and the small farms are called *quintas*. In the northern portions the population is far more laborious than in the southern, where few laborers are to be found above the age of 22. In the southern provinces, as soon as the young men marry they yearn for independence and live upon a little patch of land, which is generally presented to them by the planters. This class of laborers are attached to the plantation, and are called *inquilinos*. In consideration of the land and accommodation granted to them, they are bound to assist the planter during the *rodeos* (cattle fair) and the *trilla* (threshing season).—The manufactures of Chili are not extensive, but are increasing under the patronage of the government, which has endeavored to introduce them by offering exclusive privileges. Among them are hempen cloths, cordage, soap, tallow, leather, charcoal, flour, brandy, the coarser kinds of work in gold, silver, copper and iron, earthenware jars of a superior description, and ponchos. The latter, though woven in the rudest looms, possess some qualities which the French and English goods have never been able to attain. *Charqui*, or beef dried in the sun, is also produced in considerable quantities.—The greater part of the foreign trade of Chili is with Great Britain. The articles most extensively exported are copper, silver, wheat, flour, barley, hides, and wool; and the imports include nearly every variety of manufactures and foreign products. The total value of the exports for 1870 is shown in the following table:

Countries.	Value.	Countries.	Value.
Peru.....	\$5,220,000	France.....	\$1,750,000
Uruguay.....	940,000	Germany.....	180,000
Argentine Repub.	80,000	Belgium.....	20,000
Bolivia.....	830,000	Other European	
Brazil.....	100,000	countries.....	10,000
Central America..	80,000	Countries not enu-	
United States....	350,000	merated.....	800,000
Other American			
countries.....	270,000	Total.....	\$27,060,000
Great Britain.....	16,450,000		

The value of imports for 1870 was as follows:

Countries.	Value.	Countries.	Value.
Peru.....	\$1,470,000	Great Britain.....	\$12,760,000
Uruguay.....	80,000	France.....	6,050,000
Argentine Repub.	820,000	Germany.....	2,690,000
Bolivia.....	160,000	Belgium.....	670,000
Brasil.....	550,000	Various European	
Central America..	170,000	States.....	350,000
United States....	1,950,000	Asia.....	200,000
Other countries of			
America.....	400,000	Total.....	\$28,300,000

In 1871 the total imports from Great Britain amounted to \$12,814,900, and the total exports to Great Britain to \$18,403,067. The commercial intercourse of Chili with the United States has been very variable. In the earlier years of Californian emigration she sent large quantities of flour, grain, and lumber to that state, and took freely of our goods in return. Since that time her exports to this country have continued in large amount, but she receives little except money in return, the balances being mostly settled in Europe, where she is a debtor. In 1871 the exports to the United States were \$1,581,519, and the imports \$716,544; in 1872, exports \$1,849,880, imports \$721,799.—The government of Chili is nominally republican, and its offices elective; but practically it has been hitherto little more than a dictatorship, in which, while the forms of the constitution were tolerably preserved, the legislative, executive, and judicial functions were exercised by the party who had succeeded in seizing the reins of government. The president is elected for five years, and is eligible for a second term, but not for a third until a period of five years has elapsed. He is chosen by indirect election. The people nominate their delegates by ballot, and the latter appoint the chief of the state. The votes are examined and the declaration of the poll takes place at a meeting of the two houses of the legislature. The president is assisted by a council of state composed of 13 persons, all of his own choosing, and removable at his will, of whom, however, four must be heads of departments. The legislature consists of a senate of 20 members, elected for nine years, one third of whom go out of office every three years, and a house of deputies, consisting of one for every 20,000 inhabitants, elected for three years. Government officers may be members of either branch of the legislature, and still hold their offices. They may also represent more than one constituency. The election of the legislature is usually entirely in the hands of government, the mass of voters being the members of the national guard, who are appointees of the president, and the laborers and peons of the plantations and mines, who are entirely under the control of the wealthy proprietors, whose interests are the same as those of the president. For foreigners to obtain citizenship, ten years' residence is required if unmarried; if married, six years; if married to Chilenas, three years. The judiciary consists of primary courts, three courts of appeal, and a supreme court. The judges of the higher courts are appointed for life, or rather during good behavior, and can

only be removed by impeachment. There are four cabinet ministers: of foreign and home affairs, of finance, of war and marine, of religion and education. They are responsible for every official act, and cannot leave the country for six months after the expiration of their term of public service. No order or document from the president is legal without the counter-signature of the minister to whose department it belongs. Slavery is prohibited by law, and every person who treads the soil is declared free. In 1871 the standing army consisted of 2,400 foot, 712 horse, 804 artillery, 6 generals, 38 lieutenant colonels, 54 majors, 141 captains, and 256 lieutenants; total, 3,916 men and 540 officers, 165 of the latter belonging to the national guard. The latter comprised 30,542 foot, 21,300 horse, 2,445 artillery, and 2,149 officers. The navy consisted of 10 screw steamers, with 39 guns and 121 marines. In 1872 an appropriation of \$2,200,000 was made for increasing the naval force, and it was decided that one small ship of war and two iron-clads should be purchased. The merchant navy in 1869 comprised 255 vessels, of 58,200 tons, with 2,900 sailors. The ordinary receipts of the government in 1871 were \$11,788,500, and the ordinary expenditures \$12,542,493, showing a deficit of \$753,993. The deficit in 1869 was \$2,481,443; in 1870, \$2,464,484. The national debt, Jan. 1, 1871, was as follows:

HOME DEBT.	Capital.	Interest.	Sinking Fund, 1870
Debt at 3 per cent.....	\$3,216,200	\$97,853	\$45,550
Debt at 8 per cent.....	2,585,400	216,128	116,200
Railway loans at 6 per cent...	2,985,000	185,700	110,000
Other debts, from 3 to 5 pr. ct.	7,945,149	335,144	.....
Total.....	\$16,731,749	\$835,024	\$271,750
FOREIGN DEBT.			
Loan of 1842, at 3 per cent...	\$1,915,500	\$58,965	\$50,000
Loan of 1848, at 4½ per cent...	6,455,000	294,300	85,000
Loan of 1866, at 7 per cent...	5,096,500	366,590	140,500
Loan of 1867, at 6 per cent...	9,363,000	575,280	225,000
Loan of 1870, at 5 per cent...	5,013,000	253,175	50,500
Total.....	\$27,843,000	\$1,548,310	\$551,000
Total national debt, Jan. 1, 1871.....	\$44,574,749	\$2,383,334	\$822,750

—Chili was among the earliest of the South American states to encourage the building of railways. At the close of the year 1871 there were 474 m. open for traffic, and 138 more nearly completed. The following shows those in operation: from Santiago to Curicó, 116 m.; Valparaiso to Santiago, 115; Caldera to San Antonio, 93; Ovalle to Tongoy, 42; Coquimbo to Las Cardas, 40; Pabellon to Chañarillo, 26; Carrizal Alto to Carrizal Bajo, 25; Llaillai to San Felipe, 17; total in operation, 474 m. The following are in course of construction: From Talcahuano to Chillan, 112 m.; San Fernando to La Palmilla, 19; San Felipe to Santa Rosa de los Andes, 9; total in construction, 1872, 140 m. Chili intends to coöperate with the Argentine Republic in building a railway across

the Andes at an early day. The surveys show that the Planchon pass is the most feasible route. The length of the road by this line will be 1,023 m., and its cost is calculated at \$23,000,000 for the Argentine division and \$6,000,000 for the Chilian. The time required to build it is estimated at four years. New railways are projected also from Mejillones to the silver mines at Caracoles, 100 m.; from Huasco to Vallenar, and from La Serena to Elgin; and the Copiapó company are to extend their line to the Cordilleras. Lines of telegraph are in operation from Santiago to Valparaiso, and from Copiapó to the mining districts. In July, 1872, the Trans-Andine line, connecting Santiago and Buenos Ayres, was opened to the public. A number of other lines are in course of construction or projected. On May 13, 1868, the first steamer of a line direct to Europe, by way of the strait of Magellan, sailed from Valparaiso. This line has an annual subsidy from the government of \$60,000, to be increased to \$100,000 as soon as permanently established.—Prior to 1450, the present territory of Chili was inhabited by the ancestors of the Indian tribes now found there, who seem to have all descended from a common stock, and called themselves by the general title *Alapu-che*, people or children of the land. They were subdivided into a number of tribes, but all spoke a common language. In 1450 Yupanqui, the reigning inca of Peru, formed the project of extending his sway over the Chilian territory, and, having stationed himself with a powerful army in Atacama, despatched his lieutenant Chinchiruca, with 10,000 men, southward to subdue the *Alapu-che*. With that tact which characterized the policy of the incas, Chinchiruca sought to win rather than conquer these rude and warlike tribes; and such were his powers of persuasion that tribe after tribe yielded to the “children of the sun,” and in six years the inhabitants of northern Chili, for 600 m. from the Atacama frontier, acknowledged fealty to the Peruvian monarch. But his sway received a check. Pushing further south, his officers and soldiers encountered on the further bank of the river Rapel a warlike tribe of the *Alapu-che*, known as the Purumancians, who returned a defiant answer to the summons and representations of the inca, refused all overtures for peace, and attacked the Peruvian troops; a desperate battle followed, lasting three days, in which both armies were too thoroughly shattered to renew the conflict. Upon hearing of the result of this battle, Yupanqui wisely resolved to forbear offensive warfare, and to maintain only what he already possessed. When, some 80 years later, the Spaniards had overthrown the empire of the incas, they found Chili owing a nominal allegiance to the Peruvian monarch, and resolved to subjugate that country also; and Diego Almagro, from the double motive of glory and gold, led an expedition across the desert of Atacama and the mountain passes

of the Andes. When he reached Copiapó a quarter of his Spanish troops and three eighths of his Indian allies had perished from cold, fatigue, and starvation. They were received by the people very kindly, and met no opposition till they reached the territory of the Purumancians, where, like their predecessors, they found a foe so brave that they were fain to pause and retrace their steps. Almagro and the remainder of his force returned slowly and sadly to Peru, and five years elapsed before another expedition to Chili was attempted. Pedro Valdivia, a prudent and able commander, was selected for this service, and so well did he arrange his plans that, though occasionally meeting with hostile bands of Indians, he penetrated without serious difficulty to the river Mapocho, and encamped upon the present site of Santiago. Finding the location pleasant and the adjacent country fertile, he here founded a city, to which he gave the name of the patron saint of Spain. Scarcely had he fortified himself in his new town before the Indians, availing themselves of his temporary absence, assailed it, and would have taken it but for the hasty return of the commander; but though balked of their intended prey, they returned again and again to the charge, till Valdivia was compelled to send for reinforcements from Peru. After the arrival of these he proceeded southward, and, though the Purumancians seem to have offered no effectual opposition to his progress, he found after crossing the Maule, which formed their southern boundary, a new foe, braver and fiercer than any he had hitherto encountered—the Araucanians, now for the first time appearing on the page of history. So terrible and unexpected was their first attack, that it well nigh annihilated Valdivia's army, and compelled him to retreat to Santiago, and eventually to return to Peru for further reinforcements. He returned in 1550 with a large and well appointed force, and founded the city of Concepcion, on a site now known as Penco. Here the Araucanians rallied their forces, and with 4,000 men under Aillavalu attacked the new city with a more determined valor than any Spanish general had before witnessed. It was not until the fall of their leader that they would yield an inch of ground. Conflict after conflict followed, and in 1559 Valdivia was captured by the Indians and put to death. They afterward destroyed Concepcion, resisted all attempts to rebuild it, and eventually marched upon Santiago and placed it in great peril, but were finally repulsed. Under the count Mendoza the Spanish forces, often reinforced, still persisted in their policy of conquest; but at length, when more than 100 years had been wasted in the effort to drive the Indians from the territory south of the Biobio, the Spaniards were compelled in 1665 to make a treaty of peace, and acknowledge the independence of these mountain tribes, and establish the limits of their territory. This peace lasted till 1723, when war broke out again,

and lasted with slight intermissions for 50 years. Under Spanish rule Chili formed a viceroyalty divided into 13 districts. By perverse misgovernment the resources of the country were undeveloped and the minds of the people alienated. In 1810 began the revolution which resulted in its independence. In July of that year Governor Carrasco was deposed and a junta formed with the secret design of severing the connection with the mother country. In April, 1811, the first blood was spilled. The Spanish authorities, becoming apprised of the intentions of the patriots, attempted to overawe them and their leaders. Royal troops drawn up in the great square of Santiago were attacked by the patriots and defeated with a considerable loss on both sides. In the same year Don Juan José Carrera was appointed by the junta supreme president of the congress and general-in-chief of the army. In all the skirmishes in the beginning of the contest the patriots were successful. In 1813 a powerful army under Gen. Paroja invaded Chili, and was twice defeated by Carrera; but the royalists receiving large reinforcements, the country was overrun and obliged to own once more the sovereignty of Spain. After three years of tyranny, the patriots raised an army in La Plata, and under the command of Gen. San Martín marched into Chili and defeated the royalists at Chacabuco, Feb. 12, 1817. An elective government was organized, of which Don Bernardo O'Higgins was made supreme dictator. Again the Spaniards rallied, and in a battle fought at Chancarayada defeated the patriots with heavy loss. The royalists, lulled into security by the result of this engagement, were attacked suddenly by the Chilenos in the plains of Maypu, April 5, 1818, and routed with great slaughter, not more than 500 escaping from the field. This secured the independence of Chili, and decided as well the fate of Buenos Ayres and Peru. The port of Valdivia was held by the Spaniards till 1820, when it capitulated. Gen. O'Higgins held the dictatorship till 1823, when he was obliged to resign in consequence of a popular tumult. A provisional triumvirate succeeded him for a few weeks, when Gen. Freire became dictator. In 1828 a constitution was adopted. In 1831 a convention was called for its revision, the result of which was the present constitution, promulgated May 25, 1833. Though less revolutionary than some of the South American states, Chili has passed through several attempted forcible changes of the government. The most formidable of them occurred in April and September, 1851. That of April was instigated and commanded by Col. Urriola, who lost his life in a severe battle between the insurgents and the government forces at Santiago. That of September was led by Gen. De la Cruz, the defeated candidate for the presidency at the preceding election. At one time it threatened to prove a revolution, as in nearly every conflict the insurgents were victorious; but at length

the money of the government effected what the valor of its armies could not, and after 4,000 soldiers had fallen in battle and the productive industry and commerce of the country had suffered immense injury, the revolt was quelled and an amnesty granted to the insurgents. Chili passed through this crisis in her history under the presidency of Don Manuel Montt, a man of great ability, who had been the minister and adviser of Gen. Bulnes, his predecessor in office. He restored peace and prosperity to the country, and it has since enjoyed internal tranquillity. President Montt was reelected in 1856. Under his administration a civil code was framed, tribunals of commerce were established, a discount and deposit bank founded in Valparaiso, and a bank to advance money on real estate opened Jan. 1, 1856. Treaties of commerce were concluded with France in 1852, and with Sardinia and the United States in 1856; a free-trade treaty with the Argentine Republic in 1856 (abrogated in 1868); and with Great Britain in 1856. Walker's invasion of Nicaragua led President Montt to conclude, in November, 1856, a political alliance with Ecuador and Peru, which was joined by Costa Rica. In 1861 José Joaquín Pérez was elected president, and was reelected in 1866. In 1862 the Araucanians gave the republic much trouble, under the lead of De Tonneins, a Frenchman, who claimed to be king of Araucania and Patagonia, under the title of Orlélie Antoine I. He was captured during the year, and confined in prison, but was released in 1863. In 1864 Chili sympathized warmly with Peru in her struggle with Spain, and in the following year became herself involved, and her coast was blockaded by a Spanish fleet. Chili declared war, and a loan of \$20,000,000 was authorized. On Nov. 26 the Chilean steamer Esmeralda captured the Spanish gunboat Covadonga, with Admiral Pareja's correspondence on board. Two days after Admiral Pareja, dispirited by want of success, committed suicide, and was succeeded by Commodore Nuñez. On Jan. 14, 1866, a treaty, offensive and defensive, with Peru was proclaimed. An engagement between the allied fleets of Peru and Chili and a part of the Spanish fleet took place Feb. 7, 1866. The Spanish withdrew, but little damage was sustained by either side. On March 31 Admiral Nuñez bombarded Valparaiso, notwithstanding the earnest protest of all the foreign ministers and consuls. The firing began at 9 A. M. and lasted 3½ hours, between 2,000 and 3,000 shot and shell being thrown into the city. No shot was returned from the town. The destruction was immense, most of the public and many private buildings being demolished. The loss was estimated at \$10,183,000, of which about nine tenths was sustained by foreign residents. In April following the fleet left the Chilean waters, and the war thenceforth was merely nominal. A treaty of armistice and indefinite truce, brought about by the mediation of the United

States, was signed at Washington April 11, 1871. In 1869-'70 the Araucanians again proved troublesome; but in 1871 their self-styled king had left the country, and Chili was preparing to occupy it permanently. During the past few years Chili has made great material and intellectual progress. New mines have been opened, agriculture has made steady advances, means of communication have been increased, schools and libraries have been established, and improved means of education adopted, and numerous measures of social reform inaugurated. Agricultural schools have been founded, and a national agricultural society is in successful operation. In 1873 this society sent a collection of the agricultural products of the country to the Vienna exposition. Religious instruction is no longer made obligatory in private schools; dissenters from the established Roman Catholic religion are allowed to worship in buildings belonging to private individuals, and to be buried in the cemeteries; and civil marriages have been legalized. Among new measures proposed are a bill for the abolition of flogging, another for the reform of the election laws, and a third for a new assessment of landed property. A mole, to cost \$400,000, is to be constructed at Valparaiso; the navigation of the river Valdivia is to be improved; and the bar at the entrance of the Maule is to be opened, so as to render the harbor of Concepcion more accessible. There is also a project to widen the principal streets of Santiago, and to beautify it. There is a strong liberal party in Chili in favor of curbing the power of the clergy in political affairs, of separating church and state, and of abolishing the property qualification for suffrage. Suffrage is now much restricted, there being only about 40,000 voters in a population of 2,000,000. In the election of 1871 the liberals nominated as their candidate José Urmenita, and he was supported by a large portion of the wealth and intelligence of Chili; but Federigo Errazuriz, the candidate of the clerical party, was elected, all the government patronage being employed in his interest.—The following works treat of the history, geography, commerce, &c., of Chili: Molina's "History of the Conquest of Chili" (1782), and "Geographical, Natural, and Civil History of Chili" (1787; English translation, Middletown, Conn., 1808); M. Claude Gay's "Natural History of Chili," published by the government; Von Tschudi's "Peru;" Lieut. Gilliss's "Report of the United States Naval Astronomical Expedition" (6 vols., Washington, 1855-'8); and Lieut. Smith's "Araucanians" (New York, 1855). The subject of "Araucana," Ercilla's great epic, was a war with the Araucanians in the middle of the 16th century. (See EROILLA.)

CHILIASM. See MILLENNIUM.

CHILI, PERU, AND BOLIVIA, the War between. See supplement.

CHILlicothe, a city of Ohio, capital of Ross county, on the right bank of the Scioto river, 45 m. in a direct line, or 70 m. following the

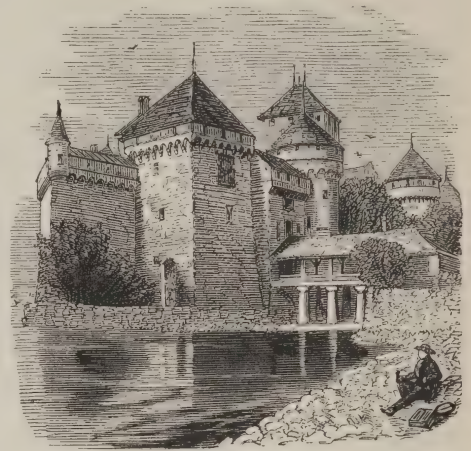
windings, above its junction with the Ohio, and 3 m. above the mouth of Paint creek, 45 m. S. of Columbus, and 96 m. N. E. of Cincinnati; pop. in 1870, 8,920. The Marietta and Cincinnati railroad renders accessible the rich coal and iron mines of southern Ohio. The Ohio and Erie canal extends from Portsmouth, at the mouth of the Scioto, through this city, to Columbus and Cleveland. Chillicothe is the centre of nearly all the trade of the rich farming country bordering on the Scioto, one of the finest agricultural districts of the United States. It is beautifully situated, 30 ft. above the river, on a plain which forms the bottom of a valley, enclosed by two ranges of cultivated hills 500 ft. high. The principal avenues follow the course of the stream, and are intersected at right angles by others, all lighted with gas, and regularly planned. The two main streets, which cross each other in the centre of the city, are each 99 ft. wide; Water street, facing the river, is 82½ ft. wide; and the width of the others is 66 ft. A supply of water is obtained from works erected at a cost of \$75,000. There are many handsome public buildings, including 13 churches, 4 brick school houses, and a stone court house, which cost over \$100,000. The manufacturing industry is important, embracing 7 carriage and wagon factories, 3 flour mills, 5 bakeries, a machine shop, a saw mill, a distillery, a manufactory of agricultural implements and edge tools, a planing mill, a paper mill, a pork-packing establishment, a book-bindery, an iron foundry, and a manufactory of mattresses. There are 11 hotels, an insurance company, and 3 national banks with an aggregate capital of \$400,000. The city is divided into four wards, and is governed by a mayor and a common council of two members from each ward. It contains 36 public schools, including a high school, which in 1871 had 42 teachers and an average attendance of 1,857. There are also two Catholic parochial schools, with an average attendance of 692, a commercial college, a select school for girls, and three newspapers. Chillicothe was founded by emigrants from Virginia in 1796, and from 1800 to 1810 was the seat of the state government.

CHILLIES. See CAPSICUM.

CHILLINGWORTH, William, an English divine and controversial writer, born at Oxford in October, 1602, died at Chichester, Jan. 30, 1644. He was admitted a scholar of Trinity college, Oxford, in 1618, and elected a fellow in 1628. He made great proficiency in divinity and mathematics, and displayed remarkable skill in disputation. The theologians and university scholars in his time were constantly debating the comparative merits of the churches of England and Rome, and Chillingworth, while delighting in ingenious argumentation, became unsettled in his opinions. A Jesuit named Fisher convinced him of the necessity of an infallible rule of faith, whereupon he immediately abjured Protestantism and proceeded to the college of the Jesuits at Douai. He had

no sooner taken this step than he "doubted that his new opinion was an error," and by invitation of Laud, then bishop of London, he returned to Oxford to reëxamine the whole question. He soon abandoned the Roman church, and in 1634 wrote a refutation of the arguments which had induced him to join it. Engaging in controversy with several distinguished Jesuits, he published in 1638, in answer to one of them, his "Religion of Protestants a Safe Way to Salvation," which passed to a second edition in five months, was received with general applause, and is still esteemed one of the ablest defences of the Protestant cause. Maintaining that the Protestant's sole judge is the Bible, and its sole interpreter private judgment, he was opposed not only by the Roman Catholics but by the Puritans, who affirmed that he destroyed faith by resolving it into reason. The appellations of Arian and Socinian were applied to him, and he for a time declined preferment on the ground of scruples in regard to subscribing to the thirty-nine articles. In 1638 he subscribed to the articles, regarding them as a basis of peace or union and not of belief or assent, and was promoted to the chancellorship of Salisbury, with the prebend of Brixworth annexed. During the civil war he was zealously attached to the royal party, and at the siege of Gloucester in 1643 he directed the making of some engines in imitation of the Roman *testudines* for assaulting the town. He was taken prisoner a few weeks before his death, and was buried in the cathedral of Chichester. Dr. Cheynell, who was one of his severest antagonists, attended and treated him kindly in his last sickness, but appeared at his funeral, and after an admonitory oration hurled a copy of the "Religion of Protestants" into the grave of its author, exclaiming, "Earth to earth, dust to dust." Cheynell published "*Chillingworthi Novissima*, or the Sickness, Heresy, Death, and Burial of William Chillingworth" (1644; 2d ed., 1725), which has been described as "the quintessence of railing, which ought to be kept as the pattern and standard of that sort of writing." The works of Chillingworth have been frequently republished, the earliest complete edition being that of London, 1742, in folio, with a life of the author by Dr. Birch (new ed., 3 vols. 8vo, Oxford, 1838). The constant study of them is recommended by Locke "for attaining the way of right reasoning." Anthony Wood affirms that "it was the current opinion of the university that he and Lucius, Lord Falkland, had such extraordinary clear reason that if the great Turk or the devil could be converted, they were able to do it." His character and ability were admired by his contemporaries, and he was reckoned the most acute logician of his age; yet Lord Clarendon says that he "had contracted such an irresolution and habit of doubting, that at last he was confident of nothing." He has therefore been cited by Dugald Stewart as an instance of the ruinous effects of scholastic logic.

CHILLON, Castle of, a fortress in the canton of Vaud, Switzerland, near the E. extremity of the lake of Geneva, on an isolated rock surrounded by deep water, and connected with the main-



Castle of Chillon.

land by a wooden bridge. It was built according to some historians in 1120, and according to others in 1236 or 1238. It is not certain by whom it was built, but it is attributed by some writers to Amadeus IV. of Savoy. For many years it was a state prison. Bonnivard, prior of St. Victor, was confined here from 1530 to 1536. The place has been rendered famous by Byron's "Prisoner of Chillon." The castle is now used as an arsenal.

CHILMARI, or **Chilmaree** (Hindoo, *Chalamari*), a beautifully situated but ill-built town of Bengal, on the Brahmappootra, in the district and 36 m. S. E. of Rungpoor. At certain religious and commercial festivals, from 60,000 to 100,000 Hindoos are said to assemble here.

CHILO, or **Chilon**, one of the seven sages of Greece, and one of the ephori of Sparta, flourished about the commencement of the 6th century B. C., and is said to have died of joy on occasion of his son's gaining the prize for boxing at the Olympic games. The institution of the ephoralty has been frequently, but it is believed erroneously, ascribed to this sage. According to Pliny, he caused the words "Know thyself" to be inscribed in letters of gold on the temple of Delphi. He said that three things were very difficult: to keep a secret, to make the best use of time, and to suffer injuries without murmuring.

CHILOE. **I.** The southernmost province of Chili, comprising the island of the same name and the other islands of the archipelago of Chiloe, and the islands of the archipelago of Chinos. Since 1865 the entire western coast of Patagonia, up to the ridge of the Cordilleras, and its islands as far as Cape Horn, have been added to it. Exclusive of this addition, over which the jurisdiction of Chili is merely

nominal, the area of the province is estimated at about 9,050 sq. m.; pop. in 1870, 62,983. The chief towns are San Carlos or Ancud, the capital, Castro, and Chacas, all on the island of Chiloe. **II.** An island in the above province, lying off the S. W. extremity of Chili, between lat. $41^{\circ} 45'$ and $43^{\circ} 30'$ S., and lon. $73^{\circ} 30'$ and $74^{\circ} 30'$ W. It is separated from the mainland on the N. by the strait of Chacas, about a mile wide, and on the E. by the gulf of Ancud, about 35 m. wide. It is 120 m. long from N. to S., and about 50 in breadth at the widest part; but a deep indentation reduces its breadth in the centre to about 15 m. The western coast is rocky, rising abruptly from the sea to a height of from 1,500 to 3,000 ft.; on the east the coast is of moderate elevation. There are numerous inlets which afford good anchorage, but no large harbors; the best are San Carlos, Castro, Chacas, and Dalcahue. The interior is little known, being filled with rugged mountains, some of which are sterile and some covered with dense forests. The climate is temperate and healthy, but is unpleasant on account of the incessant rains which prevail for ten months in the year. The air is almost continually loaded with moisture, so that it is frequently necessary to dry the wheat and barley crops by artificial means. Ice does not form, and frost and snow are rare. The soil is a rich sandy loam of extraordinary fertility, but, on account of the dampness of the atmosphere, the cereals do not thrive. The potato is indigenous, and has reached by cultivation a fair degree of excellence. Flax, tobacco, vegetables, and fruits are also raised. Agriculture is in a very primitive condition, the implements used being of the rudest description. Cattle, sheep, and swine are bred in great numbers. The horses are small, but hardy and strong. Poultry of all kinds abounds. Fish and shell fish are found in abundance along the coast, and constitute an important part of the food of the inhabitants. Traces of coal exist, and some of the streams are strongly impregnated with copper, iron, and other minerals, but no mines have been developed. The principal manufactures are *carro*, a coarse woollen cloth, dyed blue, used for men's garments, ponchos, blankets, and other fabrics of wool; cables, hawsers, and ropes are also made, and salt and dried fish are prepared to some extent. The chief exports are timber, fire wood, hides, wool, hams, dried fish, brooms, and a little wheat. The imports are sugar, wine, brandy, tea, salt, indigo, hardware, wearing apparel, and household furniture. The inhabitants are whites, Indians, and mixed. The whites are either Chilenos or Spaniards, the latter being almost the only Europeans. The Indians, who are Araucanians, are few in number. The people of all classes are temperate and honest, drunkenness and crime being nearly unknown. Chiloe was discovered by the Spaniards in 1558. Castro on the E. coast, founded in

1566, was formerly the capital.—The Chiloe archipelago is composed of the island of the name and of over 60 smaller islands, lying between it and the mainland, about half of which are inhabited. Several of them are well cultivated, but most are mountainous and sterile. The principal ones are Quinchas, Lemuy, Chalcuco, and Llaicha.

CHILTERN HUNDREDS, a small hilly district extending through part of Buckinghamshire and Oxfordshire, England, to which a nominal office is attached in the gift of the crown, the person chosen to fill it being called the steward of the Chiltern Hundreds. This office is associated with a parliamentary usage of England. A member of the house of commons cannot directly resign his seat; to accomplish that object indirectly, it is customary for a member wishing to resign to accept a nominal office under the crown, such as the stewardship of the Chiltern Hundreds, whereby his seat in parliament is vacated, and a new writ is issued.

CHIMÆRA, in Grecian mythology, a three-headed, fire-breathing monster, sprung from Typhon and Echidna, and killed by Bellerophon.



Bellerophon on Pegasus attacking the Chimæra.

The fore part of its body was that of a lion, the hind part that of a dragon, and the middle part that of a goat; while it had three heads, each of which resembled that of one of the three animals. It was described by the poets as committing great ravages in Caria and Lycia, and some critics suppose that the myth was suggested by the volcano called Chimæra near Phaselis in Lycia. Works of art have recently been discovered in Lycia on which the Chimæra is represented, not as a monster of triune conformation, but in the simple form of a species of lion still found in that region. The term *chimæra*, applied figuratively to a vain, idle fancy, is derived from this fabled monster.

CHIMÆRA, a name given to the holocephalous suborder of the selachians or sharks, from their strange appearance. (See SEA CAT.)

CHIMAPHILA (Gr. *χίμα*, winter, and *φίλος*, a friend), a drug consisting of the leaves of *chimaphila umbellata*, a small evergreen plant called wintergreen or pipsissewa, belonging to the heath family, growing in the northern latitudes of both continents. The leaves contain a resin, a bitter principle, a volatile oil, and tannic acid, all of which contribute to its medicinal efficacy. It is used in affections of the kidneys and urinary passages, acting as a diuretic and astringent. Decoctions and extracts are employed. *C. maculata* probably possesses similar virtues. The dose of the decoction is a pint in 24 hours; of the fluid extract, half a dram to a dram.

CHIMARA, Khimara, or Chimari. See CERAUNIAN MOUNTAINS.

CHIMAY, the name of a little principality in the Belgian province of Hainaut, with a thriving capital of the same name on the river Blanche, in the arrondissement of Charleroi. In former times it belonged to the lords of Croy. In 1470 it was made a county by Charles the Bold of Burgundy, and in 1486 a principality by Maximilian of Hapsburg. After passing through various hands, it came by inheritance in the beginning of this century to the French family Riquet de Caraman.

CHIMAY, Jeanne Marie Ignace Thérèse, princess of, born in Saragossa about 1775, died in Belgium, Jan. 15, 1835. She was the daughter of Count Cabarrus, minister of finance in Spain. Married at a very early age to M. de Fontenay, a councillor to the parliament of Bordeaux, from whom she was soon divorced, she became interested in the revolutionary movement, but gave umbrage to the government and was arrested. Tallien, on passing through Bordeaux, fell in love with her, procured her liberation, and finally married her. On her arrival in Paris, her beauty created a great sensation. She took a deep interest in politics, siding with the moderate republicans. She prevailed upon her husband to engage in a plot for the overthrow of Robespierre, and was thus the promoter of the revolution of Thermidor (July, 1794). From this period her house became the centre of the most brilliant society of Paris, and she was for years, but especially during the directory, the queen of fashion. She appeared in the Tuileries in a Greek or Roman costume, remarkable for its transparency, and won admiration by the classical perfection of her person. Such triumphs were far from being agreeable to her husband, who had still more serious causes of complaint. He left France, first travelling in England, then accompanying Bonaparte to Egypt. On his return to Paris he was divorced from his wife by mutual consent. In 1805 she took as her third husband Count Caraman, François Joseph Philippe de Riquet (born Sept. 21, 1773, died March 2, 1843), who soon became prince of Chimay, and lived with him on good terms, residing in Paris, Nice, or at his castle of Chimay in Belgium. She kept for many years her rank among the

beauties of France, but was never admitted to the court of Napoleon; and although her husband had access to nearly all the courts of Europe, she was excluded from them, even from that of Belgium, where the prince held the office of first chamberlain to Leopold. Her revolutionary reputation had closed to her the doors of the monarchical world. She was not only a handsome, but a most generous, kind, amiable, and witty woman, always ready to serve even her enemies. A lady whom she had saved from death during the revolution said of her, "If you call Madame Bonaparte our lady of victory, you must call Madame Tallien our lady of good help."

CHIMBORAZO, a mountain of Ecuador, South America, the most famous peak of the Andes, situated in lat. 1° 30' S., lon. 79° W. It was



Chimborazo.

for a long time supposed to be not only the highest point on the western continent, but the highest in the world. This distinction it has now lost, as it ranks only as the sixth among the loftiest peaks of the Andes, and falls far below some of the mountains in the Himalaya chain. Its elevation above the sea was ascertained by Humboldt to be 21,422 ft. It is surrounded by high table lands, above which it rises less than 12,000 ft., so that on a near approach it appears less gigantic than when viewed from a distance. The form of the mountain is that of a truncated cone, and its appearance from the coast of the Pacific is peculiarly grand. Nearly 200 m. distant, it

resembles an enormous semi-transparent dome, defined by the deep azure of the sky; dim, yet too decided in outline to be mistaken for a cloud. Its top is covered with perpetual snow. Humboldt and his companions, in June, 1802, made extraordinary exertions to reach its summit, and arrived within about 2,000 ft. of that point, then believed to be the greatest elevation ever attained by man. Here they planted their instruments upon a narrow ledge of porphyritic rock, which projected from the vast field of unfathomed snow. A broad impassable chasm prevented their further advance; besides which, they felt in the extreme all the usual inconveniences of such high situations. They were enveloped in thick fogs, and in an atmosphere of the most piercing cold. They breathed with difficulty, and blood burst from their eyes and lips. J. B. Bous-singault, in December, 1831, ascended still higher, reaching an elevation of 19,695 ft.; but the summit of this gigantic mountain still remains unexplored by man.

CHIMES, a set of bells tuned to the modern musical scale, and struck by hammers which are moved either by clockwork or by hand. In the latter case they are commonly termed *carillons*, a name applied by the French in common parlance indiscriminately to the tune played and to the series of bells, whether sounded by machinery or by hand, though the most accurate writers distinguish the latter as *carillons à clavier*. The mechanism for sounding chimes consists of a cylinder from the circumference of which project pegs placed at proper intervals according to the order in which each bell is to be struck. This is made to revolve by clockwork, and the pegs are thus brought into contact with levers operating upon the bell hammers. Carillons are played by means of an attachment similar to the key board of a pianoforte; for the larger kinds the keys are of great size, and the performer strikes them not with his fingers but with his fists, which are guarded by leathern coverings. Notwithstanding the great force requisite in playing this colossal instrument, musicians have sometimes acquired marvellous skill in performing on it the most difficult airs. It is often adapted to music in three parts, the base being played on pedals and the first and second trebles with the hands. Potthoff, a blind organist and carillon player of Amsterdam, used to execute fugues on it, though every key required a force equal to the weight of 2 lbs. A pleasing application of chimes is made to clocks and watches, by which they ring out the hours, halves, and quarters. When intended to be placed in a small compass, the bells are arranged concentrically one within another. This species of music is supposed to have originated in some of the monastic institutions of Germany, and the first instrument for producing it is said to have been made at Alost, in the Netherlands, in 1487. Among the finest sets of chimes in Europe are those at Copen-

hagen and Ghent. At Amsterdam there are both carillons and chimes, the former of three octaves, with all the semitones complete.

CHIMNEY (Lat. *caminus*, Gr. *καίωρος*, a furnace), the flue for producing a draught and conveying off the smoke of a fire. Simple as these contrivances are, chimneys do not appear to have been known in ancient times. According to Tomlinson, they were probably in use in England before those of Padua, the earliest record of which carries them back to some period previous to 1368, when Carraro, lord of Padua, introduced them into Rome. But the use of the curfew bell in preceding centuries indicates their absence, when the practice prevailed of thus summoning the people to cover over the fires that burned in pits in the centre of the floor, under an opening in the roof. In Venice they appear to have been common in the 14th century, a number being thrown down, it is recorded, by an earthquake on Jan. 25, 1347. Leland thus speaks of Bolton castle, which he says "was finished or kynge Richard the 2 dyed:" "One thyng I muche notyd in the hawle of Bolton, how chimeneys were conveyed by tunnells made on the syds of the walls betwyx the lights in the hawle, and by this means, and by no covers, is the smoke of the harthe in the hawle wonder strangely conveyed." But for centuries afterward they appear to have been known only as luxuries in the houses of the great; and in the time of Queen Elizabeth visitors were occasionally sent to houses thus provided, that they might have the enjoyment of this convenience. Beckmann, in his "History of Inventions," has gathered from ancient sources many curious allusions to what in our translations are called chimneys; but these appear after all to have been nothing better than holes in the roof, through which the smoke found its way out, as from the wigwags of the American Indians. Neither Vitruvius nor Julius Pollux, an ancient lexicographer, who gives the names of all parts of a house in Greek, nor Grapaldi, who does the same in Latin, makes mention of chimneys. Among the most ancient ruins no traces of them are found, nor have any been discovered in Herculaneum, though charcoal has been met with in some of the apartments. The mode of warming rooms appears to have been to place upon the floor a portable pan or furnace containing live coals. Hence the propriety of the observation of the poet Sospater, that one qualification of a perfect cook was the art of determining which way the wind blows; and also of the advice of Vitruvius, that there should be only plain cornices in rooms where there are to be fires and lights, as more elaborate ornaments would soon be filled with soot. Anacharsis, the Scythian, speaks of the Greeks keeping the smoke without, and bringing only fire into their houses; and Heliogabalus is said by Lampridius to have burned in the stoves spices and costly perfumes instead of wood. The Persians, who still retain some of the most

ancient customs, are described by Pietro della Velle as making their fires in a round or square hole in the earth floor of their apartments, in which is an iron vessel containing the fuel. Over it is placed a low table, covered with a thick quilted cloth, reaching to the floor. The heat is described as being exceedingly agreeable, and not causing uneasiness to the head, though no provision is made for conveying away the gaseous products of combustion. A pipe for blowing the fire with the mouth is made to project up from the floor.—To such expedients were the most refined nations of antiquity probably reduced in their ignorance of the simple chimney flue; a fact which would seem quite irreconcilable with the progress they had made in many of the arts dependent more or less upon the use of fires, were it not that these were less essential to them than to the inhabitants of more northern latitudes. The tendency of heated air to ascend must have been almost as familiar to them as that of water to flow down inclined planes; and to us it would seem to require not much more ingenuity to devise pipes for conveying the former away, than to contrive aqueducts which to this day are regarded as extraordinary works of art. It was the every-day need of supplies of pure water, and not of artificial warmth, which alone made the difference. This tendency of warm air to form ascending currents comes from its greater proportional lightness as it is expanded by heat and made to occupy a greater space. Deep mines in cold countries well exemplify the working of this principle. In the winter season the deep shafts are perfect chimneys of ventilation. The air enters the mines through the lowest openings into them, and mixing with the smoke of the candles and of the gunpowder blasts, acquires from these, and from the warmer underground temperature, a greater heat than that of the air above. Expanding in bulk, it floats upward, establishing an ascending current, which is renewed by succeeding portions of air, and which rapidly sweeps off the gaseous impurities of the mine. But as the weather becomes warm, and the air within and without attains the same temperature, no such current is formed, and the smoke, settling in a cloud below, slowly finds its way out by those passages through which at other times the fresh air is wont to flow in. Artificial means of ventilation then become necessary. Fires are built in the mine or at the mouth of the shaft, and the foul air is also forced out by blowing machines. The ascensional power of a column of heated air is the difference between its weight and that of an outside column of the same height. It is hence increased by adding to the height of the chimney, as well as by increasing the temperature. But the chimney may be so high, especially when exposed in cold situations, that the heat taken up below may be dispersed before the air reaches the top. In this case increased height adds nothing to the draught, but di-

minishes it. Short chimneys may be made more effectual by increasing the temperature, and in locomotives this is done by the introduction of a jet of hot steam. Calculations have been made to estimate the ascending force of air in chimneys at any given increase of temperature over the external air; but these are affected by many sources of error, which render the results only approximate. The flow of air over rough surfaces is retarded by increased friction, and in small flues it experiences this resistance more than in large ones of the same construction, in the inverse proportion of the diameters of the flues. In order to apply these calculations, it is necessary to know the mean temperature of the column of air in a chimney, and this cannot be determined with accuracy. It may be approximated by finding the degree of heat a little above the lower entrance into the flue, and that at the top, and taking half of their sum. Montgolfier, the inventor of balloons, first gave attention to this subject, and proposed the following method of determining the force of the draught, or the velocity of the current, which is still considered as simple and accurate as the case admits of. It is the same velocity which a falling body would acquire in passing the distance equal to the difference in height between two equal columns of air at the different temperatures. As the velocity of a heavy falling body is ascertained at any period of its descent by multiplying the square root of the number of feet it has fallen by 8, which gives its rate per second of time, we have the data for applying to the calculations for determining the velocity of the current. Suppose the height of the chimney to be 70 ft., and the difference of temperature of the two columns to be 30° , we have the expansion of the heated column = $70 \times .0661$ (this decimal representing one sixth of the expansion due to a difference of 180° of temperature). The difference in the height of the two columns is then 4.627 ft., and the square root of this (2.15), being multiplied by 8, gives 17.2 ft. per second as the velocity of the draught. For the further consideration of chimneys especially intended to feed fires with a draught of air, see FURNACE.—Smoky chimneys have a variety of causes, such as imperfections in the flue, too contracted dimensions, too rough an inner surface, openings which admit cold air and chill it, and, the most common of all, too large an opening at the fireplace or throat. Count Rumford paid much attention to the cure of smoking chimneys. He generally found the cause to be too large a throat, and his usual remedy was to diminish it by building a bench of brick in the back of the fireplace, reaching up to the throat, and to lower the fireplace somewhat. Sometimes the aperture at the top is too large, particularly if it is below the level of some neighboring house, hill, or high trees, from which the wind may be reflected down into the chimney, or over which it may fall, and thus beat down the

smoke. An inadequate admission of air into the room in which is the fireplace will cause a chimney to smoke, a circulating current being thus as effectually prevented as if the flue itself were in great part obstructed. The opening of a door or window often shows the cause of this trouble by at once removing it. When two chimney flues come down into one room, or into two rooms which connect by an open passage, the burning of a fire in one flue may establish an upward current, which is supplied with air drawn down the other. Any attempts to make the second chimney draw could only succeed by closing the connection between them, or supplying the first with the air it requires from some other source. When a chimney smokes in consequence of the wind beating down, the height may be increased, or the diameter at the top contracted; but the most efficient remedy is usually found by adjusting a bent tube to the top of the chimney, and keeping its mouth turned in the direction of the current of air by means of a vane. The effect of the latter change is to admit a smaller quantity of air, and this is dispersed through the large body in the flue without being felt at the base. The worst chimneys usually draw well when a stove is substituted for the fireplace, and the pipe is led into the chimney. This causes an increased current in the smaller channel, being equivalent to contracting the throat of the chimney when the fireplace is used.—Tall chimneys are built to convey away the noxious fumes from chemical and manufacturing establishments, and relieve the neighborhood of the nuisance these would otherwise occasion. They are built up from a solid base, with side flues leading into the central cavity. The size of this cavity should, as in the chimneys of dwelling houses, be of rather larger area than the sum of that of the flues which lead into it. In large stacks it varies from 3 to 6 ft. in diameter. They are constructed with a brick lining, so laid as to leave an air space between it and the outer wall, the effect of this being to check the rapid dispersion of the warmth of the vapors. A chimney of this kind has been erected at Manchester, England, 415 ft. high, 25 ft. square at the base, and 9 ft. at the top. It required to build it 4,000,000 bricks. At the Thomas iron works, on the Lehigh river in Pennsylvania, are cylindrical chimneys of a thin boiler-plate iron casing, lined with fire brick; the casing being 7 ft. in diameter, and the fire brick a foot long, made and bevelled to fit the circle, the internal diameter is 5 ft. These chimneys, for their capacity, are light, substantial, and elegant; but they are not built with reference to retaining the heat of the vapors, which is here no object.

CHIMPANZEE (*troglodytes niger*, Geoff.), the form of the four-handed animals which comes the nearest to man; so much so, indeed, that Linnaeus places it under the genus *homo*, with the epithet *troglodytes* to distinguish it from man. It differs from the orang outang in

having the cranium broader in proportion to the face; in the characteristics of the skull; in the smaller size of the incisor and canine teeth, and inferior development of the jaws, giving it a more human and less beast-like head; in the difference of size in the vertebrae, the cervical being smaller and the lumbar larger in the chimpanzee; in the possession of additional dorsal vertebrae, corresponding to a second pair of ribs; in the comparative shortness of the forearm and hand; in the greater proportional length of the femur and tibia, and the less proportional length of the foot; and in many other points in the structure of the chest, loins, hands, nails, and fingers, extending in all to 23 points of difference in the osteological structure of the animals; of these 23 points, 20 in the chimpanzee have a greater similarity than in the orang to the same points in the human being, and three in the orang have a greater similarity to those of man than the



Chimpanzee (*Troglodytes niger*). 1. Hand of Chimpanzee. 2. Foot. 3. Skull.

same in the chimpanzee. Owen well observes that from these considerations, and especially from the conformation of the jaws and dental system, which in the orang are scarcely inferior to those of the lion, and greatly resemble those of the fiercer and more terrible carnivora, the chimpanzee ought to rank above the orang. The importance of these distinctions is not easily understood or appreciated from the reading of even the most lucid description, while it is seen in a moment by a glance at the skeletons of the animals, or at drawings of them. The chimpanzee is a native of Africa only, and is found principally on the Congo and Guinea coasts, and in Gaboon. The length of the arms is very great, reaching below the knees by the whole extent of the fingers. The legs have a sort of calf, but it differs from that of the human being in that it continues of equal thickness nearly to the heel. The hand differs from that of man in having the thumb much the smallest of the

fingers; the foot is properly a hand, appended to the tarsus, with a thumb extremely long, powerful, and capable of great extension. The chimpanzee walks more frequently erect on its feet than the other species, but stands with the feet much wider apart than man, and goes with the knees much more bent; and it cannot long maintain the erect position without support. It is a hideous caricature of the human race when alive; its structural differences not being nearly so distinguishable when the skeleton is clothed with the muscular flesh and covered with the hairy skin, as when it is seen denuded. It is 4 to 5 ft. high when erect, and is covered with black hair; the food is entirely vegetable; its strength is very great. In captivity in cold climates, it usually soon dies of consumption. The habits of the adult chimpanzee are very imperfectly known; what is collected concerning them being little more than the reports of the negroes, who, always addicted to the marvellous, are further possessed by a dread of these animals, at once physical and superstitious. Whenever they succeed in killing one of them they make a fetish of the cranium. Cuvier states that "the chimpanzees live in troops, construct themselves huts of leaves, arm themselves with sticks and stones, and employ these weapons to drive man and the elephant from their dwellings." He also repeats the story of their pursuit of the negresses, and carrying them off into the woods, which is still credited in the country where they are found. No reliance whatever is to be placed on the accounts of the gentleness, docility, and aptitude at acquiring human habits, of these animals when in captivity. Such anecdotes always relate to animals taken extremely young, and rendered timid and docile by the handling of the sailors, who make pets of them. As they become old they become sullen, savage, and ferocious; and there is reason to believe that there is no animal more brutally and irreclaimably vicious than one of the old males of any of these large anthropomorphic apes, whether they be oranges, gibbons, chimpanzees, or gorillas. (See *QUADRUMANA*.)

CHIMSEYANS, a nation of Indians on the northwest coast of America, extending from Milbank sound to Observatory inlet (lat. 53° to 55° N.), and including the Sebassas, Neece-lowes, Nass, and other offsets. Their language is bold, sonorous, and emphatic. They are noted for the process of inserting a piece of hard wood or ivory in a slit in the lower lip. The Chimseyans communicate with the northern branches of the Tacully or Chippewyans.

CHINA (Chinese, *Tsin*, or *Tai-tsing*). **I.** An immense empire of eastern Asia, comprising the eighteen provinces or China proper, Mantchooria, Inner and Outer Mongolia, Ili or Chinese Turkistan, Koko-nor, and Thibet. Corea and the Loochoo islands are nominal dependencies. It is bounded N. and N. E. by Asiatic Russia, whose territory on the Pacific recently acquired from China touches the Korean fron-

tier, E. and S. E. by Corea and the Yellow and China seas, S. by the gulf of Tonquin, Anam, Siam, and Burmah, and S. W. and W. by India and the states of Independent Tartary. Since the cession to Russia in 1858 of a region comprising about 300,000 sq. m., the most northern point of the empire is the northern bend of the Amoor river, lat. 53° N., and the eastern limit is the junction of the Usuri and Amoor rivers in lon. 136° E. The bay of Galong in Hainan, the southernmost point, is in about lat. 18° N., and Kara-tag, the westernmost, is in lon. 72° E. The area, deducting the territory ceded to Russia and estimated above, is 5,000,000 sq. m. according to McCulloch, 5,126,000 according to Balbi, or 5,559,564 according to Berghaus, about a third part of the continent, and a tenth of the habitable globe. Next to Russia it is the largest state which has ever existed. The integrity of the empire has however been greatly threatened during recent years. Mohammedan insurgents are in possession of portions of the provinces of Yunnan, Shensi, and Kansuh, and an independent government appears to exist in Chinese Turkistan, holding sway as far as Barkul. China is carrying on military operations in these several districts, and her former territory is likely to be reoccupied; but Russia may forestall her in some portion of it. (See *MANTCHOORIA*, *MONGOLIA*, &c.) **II.** *China Proper* is by its inhabitants called Chungkwoh (middle kingdom), or Chung-hwa (central flowery land); by the Russians and the inhabitants of northern Asia, Kitai, Ketan, or Katai (whence the ancient name Cathay); by the Anamese, Sina; by the Persians, Chin; by the Thibetans, Yulbu. It extends from lon. 98° to 123° E., and from lat. 18° to 43° N., and is bounded N. E. and N. by Mantchooria and Mongolia, from which it is separated by the great wall; E. by the ocean; S. by the gulf of Tonquin, Anam, Siam, and Burmah; W. by Thibet and Chinese Tartary. Its area is estimated by Sir George Staunton at 1,500,000 sq. m., inclusive of the province of Liautung, which lies beyond the great wall, and 1,297,999 sq. m. exclusive of it; by McCulloch at 1,348,870 sq. m.; by Malte-Brun at 1,482,091; and by Williams at 2,000,000, if the full area of the provinces of Kansuh and Chihli is included. Thus China proper is about seven times the size of France, or nearly half as large as all Europe.—The coast line from Hainan to Corea is about 1,750 m. long. From Hainan to the mouth of the Yangtse, especially in the south, it is bold and rocky, and abounds with islands, headlands, and inlets. From the Yangtse N. to the Shantung promontory it is low, and after passing the promontory again low until the highlands E. of the gulf of Liautung are met. The southern coast has a barren uninviting appearance, but the islands of the Chusan archipelago are covered with verdure and exceedingly beautiful. The Shantung promontory again is uninviting. Near the Korean boundary great for-

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ests line the shores. The waters of the Yangtse and Yellow rivers are charged with earth and give a distinct muddy color to the sea for many miles from the land, for the whole distance from the Chusan archipelago to the Shantung promontory, and to a considerable part of the gulf of Pechili. The numerous headlands, islands, and inlets of the S. E. coast afford many places of refuge for shipping, and the harbors of Hong Kong and Amoy are especially commodious and safe. Swatow, Foochow, Ningpo, and Shanghai cannot be considered first-class harbors. Each is situated upon a navigable stream, but the approaches are difficult and the depth of water is insufficient. There are several fine harbors on the coast of Shantung, of which Che-foo is the best known. Tientsin, the port of Peking, is 50 m. from the sea, and can be reached by vessels of not more than 1,000 tons burden. The harbor of Newchwang is similarly defective, but Talienwan bay offers an excellent harbor for Mantchooria. The access to this port from the land side is difficult, but it could be easily reached by a railway. The shores of Formosa and Hainan are rugged, and the ports are very inferior. Tientsin and Newchwang are closed by ice three months in the year.—The extent of China is so great and its topography so varied that it would be difficult to describe its surface as a whole. The following divisions are natural ones, and will assist to give a clearer view of the physical features of the empire than would be readily obtained by a study of its several arbitrary political divisions. 1. The mountainous region of the southeast is a district 1,000 m. long and 400 m. broad. It includes the southern and eastern portions of Kwangsi and Hunan, the whole of Kwangtung, Fokien, Chekiang, and Kiangsi, and the southernmost parts of Nganhwui. The highlands touch the coast everywhere south of Hangchow bay, and in the north occasionally reach the line of the Yangtse between the Tungting lake and Chinkiang. Throughout this area of more than 300,000 sq. m. there is no table land, no extensive plain, and no mountain chain conspicuous by reason of altitude or continuity. The mountains have a trend which corresponds with the general direction of the coast. The ranges are short and irregular, and permit the streams which drain successive depressions to break through and to reach the coast without spreading into lakes. These hundreds of streams are the highways of this part of China. No one of them, excepting the West river, which debouches near Canton, is fit for steam navigation for any great distance. In nearly all, even near the coast, exist dangerous rocks and shallows which render necessary the transshipment of produce and merchandise in transit. But the Chinese, with characteristic patience and a lack of public spirit apparently equally characteristic, continue to use these streams, making no efforts to improve them. They are the only traffic

courses, excepting a few portages, such as those through the Chiting pass between Kwangtung and Hunan; the Mei-ling, between Kwangtung and Kiangsi; and the foot paths along which coolies carry burdens. 2. In striking contrast to this broken region is the level district which stretches away from the Hangchow bay to the mountains of Liautung. This district, known as the great plain, has for its northern boundary, beginning at the gulf of Liautung in lat. 40°, the great wall, the inner course of which it follows in a curving line to about lon. 114°. Its western boundary strikes thence due S. to the Yellow river, thence S. E. to the Yangtse near Nganking, and thence E. to Hangchow, which it reaches in lat. 30° 30'. The mountainous part of the Shantung province cuts down into the centre of the plain, and detached mountains near Nanking and Chinkiang break in upon it to a limited extent. 3. West of the great plain is a second broken region, which may be styled the mineral region of China. It lies south of Inner Mongolia, and comprises the provinces of Shansi and Shensi, the N. part of Hunan, and the E. of Kansuh. 4. South of the mineral region is the lake district or central China. It embraces the whole of the province of Hupeh, the S. W. part of Honan, and the N. of Hunan. It is crossed by the Yangtse, and its northern part is drained by the Han and its affluents. Lakes form so prominent a feature of this region that the name Hu-kwang, meaning broad lakes, is applied by the Chinese to the provinces of Hunan and Hupeh. 5. Szechuen is a province of such extent, population, and wealth that it may be considered a fifth natural division of the empire. It is a great inland district, bounded by mountains, but in the main made up of plains and gently undulating lands. Its population was set down in 1812 at 27,000,000, and as it has escaped the devastations of civil war it is probably much greater now. It is supplied by its own productions with the necessities and even the luxuries demanded by the population. Its articles of export are of a nature to admit of easy transportation. Few regions of the earth are so favored as this. 6. The southwestern provinces are Yunnan and Kweichow. They are generally rough and mountainous, but in Yunnan there are some extensive table lands and some low-lying plains marked by lakes. This region is far more tropical in the nature of its climate and productions than the district east of it. The Chinese consider it unhealthy. They have done less here than elsewhere in China proper to subject the soil to tillage, and in consequence of this fact, and of the disturbed condition of the region owing to the Mohammedan and other troubles, it is now in great part an abandoned jungle.—The mountains of China hem in her territory on the north. In the east they separate the great plain from the elevated lands of Mantchooria and Mongolia. Further west taking the direction from N. E. to

S. W. which characterizes the mountains of the southern region, they bear down to the southern bend of the Yellow river. Two great ranges, the continuations of the Kuenlun and Himalaya mountains, extend from W. to E. nearly across the empire in the middle and south. The northern range enters China in about lat. 34° , and is generally termed the Peling. The southern crosses the empire in about lat. 25° , and is styled the Nan-ling. It is however the S. W. and N. E. ranges which chiefly determine the conformation of the surface of China, just as the Appalachians determine that of the eastern part of North America. These ranges are diversely named in different localities.—The most notable plain in China is the one already mentioned, which partly surrounds the mountains of Shantung, and is generally termed the great plain. It extends 600 m. from Peking in the north to Hangchow in the south, and has a breadth varying from 150 to 300 m. Its southern portion is the common delta plain of the Yangtse and Yellow rivers, the northeastern that of the Pei-ho. It is crossed by these three rivers, and suffers from the floods which they bring down, notably those of the Yellow river. That portion of the plain which lies south of the Yangtse has innumerable canals, and is protected along the Yangtse and other streams and the seashore by strong dikes and sea walls. In many places the surface has been raised so as to become fit for cultivation, by the excavation of canals and ponds. The Ta lake on its southern border appears not to have received the deposits of alluvial matter from the Yangtse which have rescued the neighboring plain from the waters of the ocean. That part of it which lies near the several courses which the Yellow river has pursued in different eras has been so frequently devastated by its floods that the great stream has been called China's sorrow. In the northern portion the climate is dry, and the soil does not produce more than a fraction of the yield procured further south. The years 1871-'2 were signalized in this region by very destructive floods, which covered a vast tract of territory between Peking and the gulf and further south. The people, having suffered for several generations in consequence of a too great diminution in the rainfall, are now driven from their homes by an excess of water. The next region of level country worthy of remark is that of central China. The general features of this district are the same as those of the great plain south of the Yangtse, and it is in these two districts that the system of canals is most extensive and perfect. The plains of Szechuen are higher, and may be compared with the rolling prairies of Iowa. The level portions of Kweichow and Yunnan are like the table lands of Mexico, but far less extensive, excepting the few alluvial districts which lie along the Yangtse and the Songtai or river of

Tonquin. The country near the West, North, and East rivers and the seacoast, in Kwangtung, is one of the most fertile portions of the empire. A great deal of level alluvial land is found here, and as the population is dense and industrious, the natural resources of the soil are improved to the utmost. In the northern part of Kiangsi lies the Poyang lake, which is surrounded by an extensive valley. Upon the streams running into the lake are found several large cities and innumerable towns and villages. The basin of the Wei-ho in Shensi comprises an area of about 60,000 sq. m. It is one of the most populous and fertile in the empire. The valley of the Fan in Shensi is less extensive, but equally rich and populous.—The rivers of China are worthy of the extent of the empire. Of these the Yangtse and the Hoang or Yellow are the chief, and rank among the leading ones of the globe. "These two great streams, similar both in rise and destination, descend with rapidity from the great table lands of central Asia, and each of them meets a branch of mountains which forces it to describe an immense circuit, the Hoang to the north and the Yangtse to the south. Separated by an interval of 1,100 m., the one seems inclined to direct itself to the tropical seas, while the other wanders off among the icy deserts of Mongolia. Suddenly recalled, as if by a recollection of their early brotherhood, they approach one another like the Euphrates and Tigris in ancient Mesopotamia; where, being almost conjoined by lakes and canals, they terminate within a mutual distance of 110 m. their majestic and immense courses." (Malte-Brun.) The Yangtse where it traverses the great plain is a broad, evenly flowing stream, admirably fit for navigation either by large or small steam or sail vessels. Beyond the plain it enters a broken country, then the low region of central China, beyond which steamers have penetrated to the foot of the gorges near Ichang in lon. $111^{\circ} 30'$, 1,300 m. from the sea. The rapids and shallows of these gorges offer a bar to steam navigation, which Blakiston and the French exploring expedition of 1868 say might be overcome by the use of towing appliances from the shore. The rapids occupy a distance of about 40 m. Above them the river is continuously navigable for junks of 100 tons as far as Soochow in the province of Szechuen, a distance of 300 m. This great river does not compare in the extent of its navigable course with the Mississippi or the Missouri. The Yellow river is usually represented upon our maps as debouching south of the promontory of Shantung. It now pours its waters into the gulf of Pechili, having lately changed its course and taken a channel which is marked on the maps as that of the Tatsing river. Taking its rise at a point due west from its recent mouth upon the Yellow sea, and not more than 1,250 m. distant, it flows in alternating courses N., E., S., then E. again, traversing a distance of 2,000

m. before it finally breaks out of the elevated and broken lands which make its waters everywhere in its upper course turbulent and unsafe for navigation. Down through the alternating table lands and gorges of this tract it pours floods which are charged with a peculiar brownish yellow loam called by Mr. Pumpelly terrace deposit, and by Baron Richthofen *loess*. In its original state it is of such constitution that when a stream of water cuts down into it vertical banks are left. Throughout the districts where it is found the inhabitants make houses in the cliffs, whole villages being constructed in this way completely out of sight of the traveller upon the plains above. When a river washes the foot of a wall of loess, the earth softens at the water's edge, and after a time a cleanly cut section of the superincumbent mass drops into the flood, to be carried along until first the sandy and then the finer particles are deposited upon the plains below. A more slowly moving stream would be less charged with the loess, and would deposit it more rapidly. But the Yellow river can only carry the mass to the level country and then struggle with the shallows and banks which it forms. The result is that the river is almost useless for navigation, and its floods, which are numerous, become peculiarly dangerous to the lower country. At low tide there is about four feet of water on the bar at the mouth of the river, and there is no part of its course where steam vessels, excepting those of very light draft and small burden, could be used. It is believed that the floods of 1871-'2, which were disastrous to an immense region in eastern Chihli, came from the Yellow river. The area of its basin is estimated at 200,000 sq. m.; that of the Yangtse at 750,000. The Chu-kiang or Pearl river with its branches, the chief of which are called the North, East, and West rivers, drains the eastern part of the basin south of the Nanling. The West river is the largest of these branches, and will prove an important artery for steam navigation. The Chu-kiang and branches drain a region of not much less than 200,000 sq. m. The navigable course of the Pei-ho lies entirely within the great plain. Tientsin is the head of steam navigation. By a northern affluent large junks go nearly to the walls of Peking. Another affluent affords communication with the country south of Peking, and still another trends away nearly to the southern bend of the Yellow river. The flood of the Pei-ho is small in comparison with that of the Chu-kiang, but it drains a region of at least equal magnitude. The river Tonquin affords ready access to the southern part of the province of Yunnan, and was considered by De Carné to be a natural outlet for the produce of that region. The Min river, which flows by Foochow-foo, the Tsih, upon which Ningpo lies, and the Tsientang, leading up to Hangchow, are the most considerable among the lesser outlets. The Liau-ho and Yahyuen-kiang are the only ones deserving

mention in Shingking or southern Mantchooria. The Irrawaddy, Salwen, Menam, and Mekong draw a portion of their waters from the S. W. of China. The Songari has its source in Shingking.—The principal lake in China is the Tungting in Hunan, which is about 220 m. in circumference. It receives the waters of several small rivers, and discharges into the Yangtse by a short outlet at the north. There are many smaller lakes connecting with it. This is the system of lakes which has been noticed as a salient feature of central China. Their immediate basin is 200 m. long and 80 broad. The Poyang, 90 m. long and 20 broad, lies midway between the Tungting and the sea, and also discharges into the Yangtse. It is very shallow excepting in seasons of high water. The scenery of the country around the lakes is very beautiful. The Taihu, near the mouth of the Yangtse, on the southern side, is about 40 m. long and 30 broad. It is very shallow, with many picturesque islands. A peculiar feature of this lake is that, although shallow, mountains rise abruptly from its shore on the western side. The Tsauhu, on the northern side of the Yangtse, west of Nanking, is smaller. The Hungtsih, in Kiangsu, connects with the Yellow river, and lies between it and the Yangtse, 150 m. from the sea. The country between the mouths of the two rivers is so marshy and full of lakes as to suggest the idea that the whole was once an enormous estuary where their waters joined, or else that their deposits have filled up a large lake which once occupied this tract, leaving only a number of lesser sheets. The lakes of Yunnan are described by De Carné as particularly beautiful. That near which the capital city is built is the largest. Other small lakes are found in Chihli and Shantung.—The extent and excellence of the canals of China have been greatly vaunted, and it is in the construction of them that the Chinese have shown public spirit more than in any other direction. But considering the vast population of the empire, its internal commerce, and the character of the country, it is wonderful that they should have left the canal system so imperfect as it is. There are many districts of an alluvial character where canals are numerous. Some of them may be natural channels, lagoons, or bayous; others have been excavated for irrigation. The writer has seen a district where a field of 20 acres could not be found, the canals being so numerous. These of course could not have been formed for purposes of traffic. In these alluvial districts many of the canals, like the bayous of Louisiana, are broad streams which excite the admiration of the traveller. It is not uncommon to find canals near Shanghai from 50 to 150 yards wide and 6 to 10 ft. deep; and one may travel there 100 miles without meeting a lock. Those canals that may be considered artificial follow generally natural channels, and are subject to fluctua-

tions of the depth of water like other streams. They are as a rule imperfectly suited to the wants of commerce. The water in them is seldom quiet, and frequently, even when there is no special flood, boats can stem the current only with difficulty. In many cases, when floods occur, they become useless. They are sometimes broad streams, where the wind creates a sea. Sometimes the course of navigation lies across a lake. The tow-paths are seldom perfect, and very often the banks are not available for towing purposes. Transverse streams are not bridged by artificial waterways. Locks as constructed in the West are unknown in China. Sluices which confine the current, and inclined planes up which boats are pulled with the assistance of rude windlasses, are used instead. The Grand canal traverses the great plain from near Peking to its S. E. point. From near Peking to Tientsin it is formed by the northern affluent of the Pei-ho. From Tientsin to Lintsing, 300 m., it follows the southern affluent. From Lintsing to Tsining it is an artificial waterway; and thence to the Yangtse it follows the lake system. From the Yangtse to Soochow and Hangchow it is everywhere broad and generally of good depth. The artificial portion between Lintsing and Tsining is now out of repair and disused. In some places the canal is carried over valleys and marshy places by means of engineering works of considerable magnitude. Boats used on the canals of China are generally of small size, from 25 to 50 tons burden, and fitted with sails, which are used when the wind will serve. When it does not serve, the crew tow the craft by lines fastened to the mast head, or propel it with oars or poles. Despatch boats frequently traverse considerable distances at the rate of five or six miles an hour. The oarsman uses his feet to work a sweep, steering his boat with a small one operated by his hands. The junks used by officials of high grade are often very large and fitted with all the appliances of a comfortable home.—From what has been said of the rivers, lakes, and canals of China, it will be seen that they do not offer perfect communication with all parts of the empire. Beyond a doubt the transportation of passengers and merchandise was 50 years ago attended with fewer difficulties in China than in any other extensive region. Nature had contributed chiefly to this condition of things, and the government in a much less measure than western people have been led to believe. At the present moment the canals are so much out of order that there is a crying need for their improvement. At the best, however, the canals of China afford so imperfect a means of communication and transportation that they would not greatly forestall the usefulness of a system of railways. The vast, unwieldy, and disjointed empire can never realize a perfect harmony throughout her various and widely differing sections until railways have been introduced. A movement, supported it is be-

lieved by prominent men in the Chinese government, is now (1873) on foot for their introduction. The government is so far afraid of foreign influence that it will endeavor to keep those which may be constructed in its own hands.—There are few roads in China worthy to be mentioned. In the southern mountainous district no vehicles drawn by dumb animals are ever used. The same may be said of the districts where canals are common. In the provinces of Chihli, Shantung, Shansi, and Shensi carts are used for the transportation of produce and merchandise. Leading S. W. from Peking across the two provinces last named is a road which has been constructed over rugged mountains at no inconsiderable expense. De Carné mentions broad paved roads in Yunnan. It may be said of the roads of China, however, as of the canals, that they have not been constructed upon a comprehensive system, and that they serve their purposes in an indifferent manner.—The climate in so vast a country as China is of course various. At Peking, lat. 41°, there is no rain from November to April; the summers are long and hot, and the mercury ranges as high as 105° F., and as low as 6° below zero. At Shanghai, lat. 31°, rains occur throughout the year; the summer opens late, and lasts longer than in the same latitude on the coast of the United States; the atmosphere is charged with moisture, and the climate presents many of the features of that of New Orleans. At Canton the prevailing rains are in the colder months; the range of the thermometer is very great, and, although about the latitude of Havana, snow occasionally falls. The mean temperature of the whole coast is lower than in corresponding latitudes elsewhere. The climate is in the main excellent. The N. W. and S. W. districts of the empire are much affected by the cold diffused from the neighboring mountains and table lands. The central region is warmer than the coast in the same latitude. In eastern Szechuen Cooper saw peas in blossom in the early part of March, and the vegetation generally was a month or six weeks in advance of that at Shanghai. The fall of rain for China cannot be stated, as it varies in different localities. At Peking it does not exceed in average years 18 inches. At Canton it is about 70 inches. A monsoon sets down the coast from October to June, and up the coast from June to October. Sand storms are not infrequent at Peking; their effect is sometimes observed on the W. coast of Japan. Earthquakes have been experienced in different periods, but for the last 40 years have been as infrequent as on the Atlantic coast of the United States. The typhoons of the coast of China occur chiefly in the months of July, August, and September. Prof. T. B. Maury considers the monsoon of the coast of China "a part of a grand cyclone whose centre is stationary over the heated plains of central Asia, whose intro-moving winds, bearing the

evaporations of the Asiatic seas and oceans, feed it with meteoric fuel for six months in the year, and whose periphery may be regarded as embracing nearly one third of the entire eastern hemisphere;" and the active typhoon as incidental to the atmospheric disturbances so created. These storms are most frequent and severe in the neighborhood of Canton, and diminish in strength toward the north. None of the greatest severity have ever been experienced near Shanghai, but on the S. coast of Japan they sometimes rage fiercely. There is reason to believe that the climate of the northern part of the great plain has undergone change in the last 200 years. Many great bridges are found there, and marks of great erosion, where now water is seldom seen. The fertility of the country has doubtless decreased with the diminution of the rainfall, and this will explain the fact that the population of Peking and the surrounding country appears to be much less than it was formerly.—Considering the extent of territory, there is probably no region of the earth possessing soils of equal fertility to those of China. There is no desert land, and no district where the rainfall is not sufficient for the more or less abundant growth of vegetation. In respect of heat and moisture China is well favored for agricultural operations. Some of the alluvial districts have been in constant cultivation for many centuries and still produce excellent crops. The range of vegetable production is very great. Sugar cane is cultivated everywhere south of lat. 30°. The centre of its production is in Kwangtung. Rice is raised from one extreme of the empire to the other, but chiefly south of lat. 33°; the variety produced further north is cultivated without irrigation. Tobacco is also raised throughout the empire, and as far north in Mantchooria as the southern bend of the Amoor. Millet is the chief crop of the northern part of the great plain. Wheat, barley, maize, and sorghum are also raised. In Shing-king pulse and wheat are the leading crops. In northwestern China rice, wheat, oats, maize, sorghum, and millet are raised. In central China rice is the leading product. In Szechuen there appears to be a wide range of production. Sugar is produced to such an extent that it competes at Hankow with that of the southern coast. Of late years the culture of the poppy has been introduced into this and the southwestern provinces, and has increased so largely that, in face of a growing consumption, the importation of Indian opium is not augmenting. The Szechuen drug sells at Shanghai at about 70 per cent. of the value of the Indian. Rice is the leading staple of the southwestern provinces. The article of produce in which foreigners are chiefly interested is tea. Green teas are produced in Chekiang, southern Nganhwui, and eastern Kiangsi; black in western Kiangsi, northern Hunan, Fokien, and southern Hupeh. Kwangtung produces both varieties, but chiefly the black. Next in

order of importance to foreigners is silk. That from the mulberry is produced in the southern and central parts of China and Szechuen, and as far north as lat. 33°. The centre of production is in the southern part of the great plain, near the mountains of the southeast. The silk-yielding varieties of the oak and ailantus are found further north, extending into southern Mantchooria and Lower Mongolia. The zone of production includes Shantung in the east and Szechuen on the west. Cotton is raised in the valley of the Yangtse and throughout the country north of that river. The orange, lemon, pumelo, mango, pineapple, cashew, betel, loquat (*eribotrya*), casambola, persimmon, and cocanut are native fruits. Apples, pears, peaches, plums, and apricots are inferior in flavor and size to those produced in the West. Grapes are extensively cultivated in the north, and compare favorably with those of Europe or America. The *leguminosæ* afford many excellent vegetables and valuable products (indigo, soya, &c.). Peculiar to China are *dimocarpus litchi*, *dimocarpus longan*, *Cookia punctata*, and *pe-tsai*, a kind of white cabbage. The sacred bean of the Egyptians (*nelumbium speciosum*) is extensively cultivated as an article of food; so are several species of *aroideæ*, also the *sagittaria Sinensis*, a kind of arrowroot. The plantain fruit is less important in China than in South America. Ginger is extensively cultivated. The *chulan* plant (*chloranthus inconspicuus*), the tuberose, jasmine, and *olea fragrans* furnish the flowers which are used to scent some sorts of tea. A kind of grass (*phragmetas*) cultivated in the south is woven into floor matting. A species of *andropogon* and one of *arundo* are used by the poor for fuel. The bamboo is cultivated about villages for its shade and beauty, and is applied to such a vast variety of purposes that it may well be called the national plant of China. The tender shoots are used for food; the roots as a material for carved work; the culms as poles, rods, sticks, canes, joists, ribs of sails, shafts of spears, and tubes of aqueducts; the leaves as covering for persons and dwellings, and for manure; the shavings for mattress stuffings. India ink is manufactured from the soot of pines, fir, and other substances, mixed with glue or isinglass and scented. Seaweed is collected on the coast and used for industrial purposes (glues and varnishes) and for food. Large trees and timber are scarce. Oak, walnut, camphor, cedar, cypress, and varnish trees grow in the mountainous districts. Rosewood and ebony are not infrequent. The willow is a favorite plant in all parts of China. The chestnut, walnut, and hazelnut are all natives of China. The palm tree is cultivated for its leaves for fans, and the *kuan-lan* for its pith, which supplies an edible flour. The tallow tree resembles the birch, but the bark is white and the branches are slender; the fruit grows in bunches, each capsule enclosing three kernels, which are coat-

ed with tallow and contain an oil much used for the lamp, while the tallow is made into candles. The varnish tree resembles the ash; it exudes an essential oil which is poisonous to the touch. From a species of sycamore, paper is manufactured. Ginseng is found in the northwest, and is extravagantly esteemed, being administered as a universal panacea. Berries (currants, strawberries, raspberries, gooseberries) are seldom found.—Wild animals generally have long since disappeared from the more densely settled provinces. There are elephants, rhinoceroses, tapirs, wild boars, bears, tigers, leopards, and panthers, in the south; monkeys of a very large species (the gibbon) in the southwest; musk deer, wolves, lynxes, boars, gazelles, antelopes, in the west; squirrels, anteaters, sables, badgers, the jerboa, martens, porcupines, hedgehogs, marmots, weasels, in various parts of the country. Domestic animals are not kept so generally as in Europe or America, the Chinese disliking meat and dairy products for food, except pork. The hog and dog are the most common domestic animals. Horned cattle are kept only for draught; some of these are of a small black breed. The gray buffalo is also used. The horses are also small; jackasses and mules are preferred to them. Large-tailed sheep are imported from Mongolia, and are reared everywhere, but not to a great extent in the south. The goat is common in the northern provinces. The camel is used as a pack animal in the northernmost portion of the empire, but is rarely seen south of Peking. It is employed in war, and trained to carry small swivels on its back. The gold, the silver, Reeves's, and the medallion pheasants are indigenous to China. There are found, besides, the peacock, pelican, albatross, parrot, spoonbill, crane, heron, stork, curlew, cormorant, thrush, red-billed magpie, swan, grebe, geese, ducks, quails, and snipe. Crocodiles are not known in China, but small lizards and serpents abound. The common frog is caught in great numbers for food, as are tortoises and turtles. Besides all kinds of fish known in northern America, such as sturgeon, mullet, carp, trout, perch, pike, and eel, there are a great many peculiar to China, as the bynni carp (*polyne-mus tetradaetylus*), the *tsang-yu* or pomfret (*stromateus argenteus*), and the *sho-kia-yeu* (*tetrodon*). The goldfish (brought to Europe in 1611) is also a native of China. The fins of sharks and rays are eaten by the Chinese; they, in fact, eat nearly every living thing found in the water. The artificial rearing of fish, as also the artificial hatching of eggs, has been practised among the Chinese from time immemorial. Oysters of a good quality are common on the coast. Of insects, the silk-worm, the wax insect, and the honey bee are the most important and useful. The white ant is found at Canton. The white wax insect furnishes the whole nation with that article, which it deposits upon a tree called the *peh-lah shu*.—This great empire, so abundantly

favoured in the character of its soil, its temperate climate, and its physical configuration, is fortunate also in the extent and value of its mineral resources. The apathetic Chinaman has not even dreamed of the wealth which lies hidden under the hills and mountains of his native land, and the people of western states are only beginning to learn how desirable it is that this vast country shall open her fields of subterranean treasures to the enterprise of the world. So far as is now known, the northwest of China, as has been mentioned, is the leading mineral region of the empire. Of one of the provinces of this district Baron Richthofen says: "Shansi is one of the most remarkable coal and iron regions in the world. Some of the details which I shall give will make it patent that the world at the present rate of consumption of coal could be supplied for thousands of years from Shansi alone. Prof. Dana, in comparing the proportions of coal lands to the whole area in different countries, says that the state of Pennsylvania leads the world, its area of 46,000 sq. m. embracing 20,000 of coal land. It is very probable that on closer examination the province of Shansi in China, with an area of about 35,000 sq. m., will take the palm from Pennsylvania by a considerably more favorable proportion. But this is not all the advantage on the side of the China coal field; another is found in the ease and cheapness with which coal can be extracted on a large scale." It appears from his statements that iron ores are found near the coal in this province, and that the deposits are very extensive and the quality excellent. Williams and Pumpelly mention other valuable deposits in Shansi. Those of salt are remarkable, while copper, quicksilver, and silver are also noticed. It is probable that the mineral region extends across Shansi into the eastern part of Kansuh and southerly into Hunan. The abbé Huc speaks of coal in eastern Kansuh. The Chinese works consulted by Pumpelly confirm the abbé's statements, and show that coal is found so far west as lon. 104° E., and south to lat. 34°. The northern part of Hunan appears to possess extensive deposits of iron, and that metal is mentioned in the Chinese accounts as occurring in Shensi. A variety of precious stones are found in Shansi. The S. W. region of China is probably only less well favored with mineral deposits. Gold is found in the bed of the Yangtse. Copper, lead, silver, zinc, and tin have been extensively worked. De Carné says that before the present troubles Yunnan annually forwarded to the imperial treasury crude copper to the value of 1,000,000 francs, and that in peaceful times 1,200 men are employed in drawing off water from the argentiferous lead mines at Sinkaitseu. He considers Yunnan more richly endowed with mineral wealth than any other province. Coal is found in different parts of the southeast, but is mined largely only in southern Hunan and east of the Poyang lake in Kiangsi. The conditions under

which these deposits took place would appear to have been similar, but the first deposit is much greater than the other. There is reason to believe that iron ores are widely distributed in this region. There are two belts where the Chinese now smelt them. One lies S. E. of Ningpo, stretching away into Fokien; the other is situated in southern Hunan. The latter is likely to prove important. It is to be said of the deposits of coal and iron in S. E. China, that the failure of the Chinese to work them indicates that they do not occur under favorable conditions. Extensive coal fields are found in Shantung, and the gold-bearing quartz of this region may hereafter be a source of wealth. Coal abounds in the mountains which range away from the promontory of Liautung to the northeast; it is mined in Shingking. Iron ores are abundant, and until the advent of foreigners at Newchwang Mantchooria was self-supplied with this useful metal. The presence of gold is asserted in Chinese works. The existence of coal in Szechuen has been spoken of, but it is doubtful whether it is widely distributed; Chinese accounts indicate that it is only found in the S. E. part of the province. Iron is mined in different parts of the province, and is cheap and abundant. Silver, copper, tin, and quicksilver are reported by the Chinese. Salt wells exist, which yield largely; the province is self-supplied, and was able to supply the markets of the adjoining provinces, E. and S., during the rebellion. Cooper relates that a gas sometimes escapes from these wells which will burn, and he infers that petroleum might be procured from the wells. Marble, porphyry, jasper, granite, and quartz are produced from the quarries of S. China. Lapis lazuli is found in the west. The crystal, ruby, amethyst, sapphire, topaz, turquoise, jade, garnet, opal, agate, jasper, and malachite are found. Sulphur exists in large deposits in Formosa. Notwithstanding the extensive supply of coal possessed by China, but little comparatively is mined. Difficulties of transportation and the heavy taxation combine to discourage mining operations. Until within a few years 90 per cent. of the coal used in foreign steamers on the coast was brought from foreign countries, notably from England. The people who live on the banks of the Yangtse cut reeds for fuel, while these rich deposits of coal exist not 200 m. away.—Of the aborigines of China only a few remnants are found (Miau-tze, or Lo-lo) in the mountains of the southern provinces. The present inhabitants migrated into the country from the northwest. The Chinese, or sons of Han, as they call themselves, are entirely different from the Caucasian race, and stand in near relation to the Mongolian. Their stature varies in different districts. At Canton the average height of adult males is estimated by Mr. Williams at 5 ft. 4 in. In the northern provinces it is probably somewhat greater. They are symmetrically built. The face is round, and the eyes

are small, having an oblique appearance, with bare lids, but thick brows; cheek bones high; nose small, and nearly even with the face at the root; forehead low; lips thicker than among Europeans, but not at all approaching those of the negro; hair straight and black; complexion yellowish brown. In the south they are swarthy, but not as much so as the Portuguese. Altogether their physiognomy is void of expression, and their general appearance not imposing. Stoutness, or rather obesity, is much admired; so are small feet and long finger nails. The Mantchoos are of a lighter complexion and slightly heavier build than the Chinese, have more beard, and their countenances indicate greater intellectual activity. As to the moral and intellectual characteristics of the Chinese, great injustice has been done to them. It is obvious that the trading populations of the large seaports cannot be considered fair specimens of the national character in general; and it is from these that travellers have taken their impressions of the people at large. The Chinese, so far as they have come in contact with Europeans and Americans, are industrious, skilful, polite, and provident. They have less personal courage than Europeans, and also a lower standard of morality. When aroused they are exceedingly cruel, yet they are not quick-tempered or revengeful. In the use of food and drink they are remarkably temperate. Their commercial enterprise is very great, and under more favorable conditions is likely to play a prominent part throughout the world. The Chinese are proud of their country and of their civilization, which was already flourishing at a time when the Christian nations had no existence. This national pride comes at least as natural to them as to those nations whom we are wont to call civilized. Considering that China contains about one third of the population of the globe; that, with the exception of steam engines and electric telegraphs, there is scarcely any great invention of modern times which has not been in use among the Chinese for many centuries; that popular education is more general and the social structure more firmly settled in China than in any other country, their overbearing demeanor and narrow-mindedness in regard to foreigners may at least appear natural. It is probable that a more intimate intercourse with them will be apt to modify in some respects the unfavorable opinion which has prevailed among Christian nations of the character of the Chinese. "Their civilization," says Williams, "has been developed under peculiar forms and influences, and must be compared to, rather than judged of by that of Europeans; the dissimilarity is as wide, perhaps, as can possibly exist between two races of beings having the same common nature and wants. A people by whom some of the most important inventions of modern Europe were anticipated (such as the compass, porcelain, gunpowder, paper, printing), and were known

and practised many centuries earlier; who probably amount to more than 300,000,000, united in one system of manners, letters, and policy; whose cities and capitals rival in numbers the greatest metropolises of any age; who have not only covered the earth but the waters with towns and streets—such a nation must occupy a conspicuous place in the history of mankind, and the study of their character and condition commends itself to every well-wisher of his race." The difficulties with which this study is beset are shown by the great diversity of opinion among those travellers who have ventured beyond the immediate vicinity of the large seaports, and improved every opportunity to get an insight into the peculiarities of their social system and national character. The tendency of recent observers, however, is to judge of them in a more appreciative way, and to explain their peculiarities by a consideration of the circumstances of their history and training. If they are vain, they have been isolated; if they are cowardly, they have had a great measure of peace; if they lack boldness in enterprise and the disposition to organize for great purposes, the government has not favored the accumulation of money or power in the hands of the common people; if they are immobile, the mass is great, and the structure of the written language is so difficult that it is mastered only by a small percentage of the population, and as a consequence the diffusion of intelligence is difficult; if they are atheistical, their religions have not been such as to commend them entirely either to their judgment or their affection.—The domestic and social life of the Chinese has perhaps more features in common with western nations than that of other oriental peoples. Although polygamy exists among the wealthier classes, and their women generally live in seclusion, family life is much esteemed and cultivated among them. The first wife has the full control of the household, while the concubines are little more than servants and housemaids. The Chinese illustrate the relation by comparing the wife to the moon and the concubines to the stars, both of which in their appropriate spheres revolve around the sun. The utmost respect and obedience to the behests of their parents are enjoined to children. The betrothment of the children is entirely in the hands of the parents, and the obligation of the former to fulfil the contract made by the latter is enforced by law, even to the annulling of an agreement made by a son himself in ignorance of the arrangements of his parents. Cleanliness is not among the virtues of the Chinese, either in regard to their habitations or their persons. The poorest people do not change their garments until they are worn out. Their houses are generally low, the roofs hipped, and the catenary curve of their edges shows that the tent is the type of the dwelling. But in size, style of building, and the arrangements of the interior, there is every variety,

from the squalid hovel to the pretentious palace. Even the best houses are poorly ventilated and lighted; the appearance of the rooms would be cheerless and uncomfortable without the gay and costly furniture and variety of ornaments. The little parks connected with the mansions of the wealthier classes are laid out in tasteful style. The streets in Chinese cities are extremely crooked and narrow; few of them exceed 10 or 12 ft. in width, and most of those in Canton are less than 8 ft. No public squares relieve the closeness of these lanes. Ventilation is, of course, very imperfect; drainage is only partially attended to, and the sewers frequently exude their contents over the pathway. Add to this the fact that offal and manure are carried through the streets by the scavengers, and we can understand the bad odor in which Chinese cities are held, and also the prevalence of ophthalmic diseases among the people. These narrow streets present a singularly animated spectacle to strangers. Itinerant workmen abound; blacksmiths, tinkers, glass menders, barbers, druggists, shoemakers and cobblers, fortune tellers, herb sellers, book sellers, money changers, and many other tradesmen, keep their movable establishments in the streets. Still, great as the bustle and crowds sometimes are, altercations or collisions are rare, and at night a remarkable quiet prevails. Ordinarily, conflagrations are soon got under. Fire engines of an imperfect construction are used, and buildings are pulled down and the inflammable materials withdrawn. The dress of the Chinese is neither so uniform nor so unchanging as is generally supposed. Fashions alter there as well as elsewhere, but not so rapidly as among European nations. If it were not for the shaven crown and braided tail of the men, and the crippled feet of the women, little fault could be found with their costume, combining as it does warmth and ease. The fabrics most worn are silk, cotton, and linen for summer, with the addition of furs and skins in the winter. The winter garments of the poor are made chiefly of padded and quilted cotton materials. The garments of the sexes differ more by their colors than by their shape and cut. Inner and outer tunics made of cotton or silk, a pair of loose trousers over which tight leggings are pulled in winter, and shoes with thick felt soles, are the principal articles of dress. The diet of the Chinese is sufficient in variety, wholesome, and well cooked, though many of their dishes would appear insipid to the taste of Europeans and Americans. The proportion of animal food consumed is probably smaller among them than among any other race in the same latitudes. Cookery is almost esteemed as a science in China. Mr. Wingrove Cooke assigns to the Chinese in cookery a middle position, below the French and above the English. The Chinaman considers the Englishman's mode of feeding the nearest approach to that of the savages of Formosa; for, says he,

"the Englishman does the chief work of the slaughterhouse upon his dinner table, and he remits the principal work of the kitchen to his stomach." The Chinese cook is anxious to disguise the original shape and appearance of the food as much as possible. He discards spices, and uses oils and fats. Many strange articles of food are eaten, but they are generally prepared in such a manner as to appear palatable to unprejudiced foreigners. Coffee, chocolate, beer, cider, porter, and brandy are unknown; their common beverages are tea and a spirit distilled from rice. Wines are almost unknown. The native tobacco is of an inferior quality; it is not chewed, but smoked or used as snuff. The pernicious habit of opium smoking prevails among all classes, and is spreading year by year, in spite of the earnest efforts of the government to prevent it. The social life of the Chinese is generally described as a mass of ceremonials and cold formalities, devoid of all real kindness of heart; but this opinion is based upon incomplete observations. In their common intercourse the Chinese are not more formal than is elsewhere considered to be well-bred; it is on extraordinary or official occasions that they observe the precise etiquette for which they are famous. Whether in the crowded and narrow thoroughfares, the village green, the bustling market, the jostling ferry, or the thronged procession, wherever the people are assembled promiscuously, good humor and courtesy are observable. Street fights, assaults, and murders are not common excepting in disturbed districts. The people are fond of processions and public shows, and celebrate several imposing popular festivals. The new-year's time, the festival of the dragon boats, the feast of lanterns, the fishermen's festival, &c., are occasions of general rejoicing and merrymaking. Gambling is universal. The violent and gladiatorial sports of other countries are held in contempt. Duels are unknown among them, and they consider a resort to force as proof of an inferior kind of civilization.—The subjoined table of the population of China is taken from the "Middle Kingdom" of Dr. Williams, who esteems the several estimates the result of regular censuses, and the only ones which may be relied upon as such. The reader is referred to that book for an elaborate and able discussion of those estimates. Taking the census of 1812 as a basis, and estimating an increase of only 20 per cent. in 60 years, the present population of China would be about 450,000,000. For the last 20 years the empire has been ravaged by internal war, and it is probable that there has been an actual decrease in its numbers. An increase of 20 per cent. would not be a large one for the preceding 40 years, and allowing a decrease amounting to 50,000,000, the present population would reach 400,000,000. The observations of recent travellers would indicate that this number is far above the true one. Baron Richt-hofen, for instance, is disposed to believe that

AREA AND POPULATION.

PROVINCES.	Area in English square miles.	Pop. to sq. m. by last census.	Census of 1711.	Census of 1763.	Census of 1812.
Chihli.....	58,949	475	3,274,870	9,874,217	27,990,871
Shantung....	65,104	444	2,278,595	12,769,872	28,958,764
Shansi.....	55,268	252	1,727,144	5,162,351	14,004,210
Honan.....	65,104	420	3,094,150	7,114,346	23,037,171
Kiangsu.....	44,500	850	2,656,465	12,618,987	37,543,501
Nganhwui....	48,461	705	1,357,829	12,435,361	34,168,059
Kiangsi.....	72,176	320	2,172,587	5,055,251	23,046,999
Chekiang.....	39,150	671	2,710,312	8,662,808	26,256,784
Fokien.....	58,480	276	706,311	4,710,399	14,777,410
Hupei.....	70,450	389	493,943	4,568,860	27,370,098
Hunan.....	74,320	251	385,034	4,836,332	18,652,507
Shensi.....	67,400	153	2,150,696	3,851,043	10,207,256
Kansuh.....	86,605	175	368,525	2,133,222	15,193,125
Szechuen.....	166,800	128	3,802,689	1,868,496	21,435,678
Kwangtung....	79,456	241	1,142,747	3,969,248	19,174,030
Kwangsi.....	75,250	93	210,674	1,979,619	7,313,595
Kweichow.....	64,554	82	37,731	1,718,848	5,288,320
Yunnan.....	107,969	51	145,414	1,008,058	5,561,219
Shingking....	.....	.....	.....	221,742	2,167,286
Total.....	1,297,999	268	28,605,716	103,050,060	362,447,183

Chekiang, set down in the table as having 26,000,000 in 1812, does not now contain more than 8,000,000. But it is dangerous to take an arbitrary calculation in such matters. The traveller sees the country for a little distance on either side of his track. He makes no count. To declare a census wrong upon such evidence would be very bold. It is to be remembered that the censuses of China have been taken for governmental purposes, and were not intended for the information of foreigners. In other statistics the Chinese records have been found quite accurate, and why should they not be in this direction? The question whether China is overpopulated does not turn upon an enumeration of the people. It is certainly known that there is no considerable district where, having regard either to the extent of land brought under cultivation, or to the methods adopted, tillage is carried to the furthest point. As but few animals are reared or used, the soil will support a larger number of people than in Europe or America, where no inconsiderable proportion of the produce is consumed by stock, and where owing to the wasteful habits of the people the best use is not made of that reserved for food. In Mantchooria and Mongolia, and in the more unpromising regions of Koko-nor and Thibet, the population is a mere fraction of what it might be. Extensive districts near the Yellow river are subject to floods and practically abandoned, which under an efficient government would be quite safe for the operations of husbandry. In western Chihli, the use of coal would admit of the growth of trees, and perhaps bring back the rainfall of former centuries; and elsewhere the presence of trees might save the land from destructive erosion. In a country where the methods and means of transportation are imperfect, any given district is practically isolated, and the disaster of a drought or flood becomes more serious. The drought of 1871 destroyed a large portion of the crops of the S. E. provinces,

while the rain precipitated a flood in the N. E. Foreign vessels were able to supply the country of the former region, but the other was inaccessible during the succeeding winter months by reason of the presence of ice, and many people died from starvation. This could not however be taken as an indication of over population. The climates and soils of China are so diverse that a famine in any district can only be disastrous as a result of a failure of transportation.—The Chinese speak but one language, but of course the aborigines still found in southern China, and those of Formosa and Hainan, have their own tongues. The spoken language has many dialects. It is not uncommon to find marked differences of pronunciation on the different sides of a mountain range or of a stream. These differences are so great that difficulty is experienced by the Chinese of one section in understanding the speech of those from another district. The written language is the same everywhere. A special article is devoted to the Chinese language and literature, but it may be said here that the language presents a great bar to the progress of the empire. More time is consumed by Chinese students in mastering the written language than is given in the countries of the West to the acquirement of a liberal education. The celebrated literary examinations of China are directed to the inquiry whether the candidates can read and write with readiness and grace. The acquisition of general or special knowledge is not thought of, and the masses are kept in a state of degraded ignorance.—The principal occupation of the Chinese is agriculture, which next to letters they consider the most honorable of all. In order to remind the people that agriculture is the basis of society, the emperor himself and the viceroys of the provinces once in every year perform the ceremony of ploughing some furrows and sowing one of the grains. Nowhere is the soil cultivated more carefully and diligently. The implements used in their agriculture are very rude. The system of irrigation is perfect, and the great importance of manuring is fully appreciated. As the scarcity of domestic animals prevents the application of stable manures on a large scale, all refuse applicable to the purpose is carefully collected. Human ordure, ashes, muck, gypsum, offal, hair (even the barbers gathering the product of their tonsorial performances, and selling it to the farmers), and whatever other matters can invigorate the soil, are freely used. The density of the population rendering it impracticable to let the fields lie fallow, and the rotation of crops not being well understood, the Chinese sustain the productiveness of the soil chiefly by constant manuring. In the fertile country between the Yellow and Yang-tse rivers and south of the latter, two crops are obtained from the same field in one year. The threshing of the grain is performed either by treading or by rollers and flails. The sedge in the marshes and grass on the hills are collected

for fodder and fuel, but it is believed not a single acre of land is sown with grass seed. Cattle raising is, therefore, the most unimportant part of the farming business. The flesh of domestic animals is rarely used for food, the hog, and in the north mutton, excepted. Butter and cheese are not made at all. Poultry furnishes the favorite meat for all classes of the population. The fields of different owners are not, as in America and England, separated by fences, walls, or hedgerows; and hence the cultivated plain appears like a vast garden, in which the plats seem to be mere beds. Hunting is profitable only in the mountainous districts of the west and southwest; there are no game laws in China. The skill exhibited by the Chinese in their various modes of catching and rearing fish is admirable. One tenth of the population derive their food from the water. Great numbers of cormorants are trained to catch fish.—The progress of the Chinese in the mechanical arts is slow; their imitative faculty having in the course of time become stronger than the inventive, they cling to their ancient implements and designs, and are slow to adopt improvements in either. But their obstinacy in this respect has been very much exaggerated. They do not greatly feel the want of improved machinery, since labor is so cheap that it would even appear cruel to replace it by mechanical forces. In the arts of metallurgy they have attained only to mediocrity, except in the alloying of metals, and in chased or carved work in gold and silver, in both of which they excel. In the manufacture of glass, though it has been but recently introduced, they are making good progress. Their porcelain was a century ago unequalled; but the quality, styles, and finish are far below the standard of that now produced in Europe, and their patterns never have compared with those of the classic ages of Europe. The manufacture of silk is original among the Chinese, and in some directions foreigners have not yet succeeded in fully equalling their products. A durable cotton cloth (nankeen) is made in the central provinces. The consumption of leather is small, and it is porous and tender in consequence of the rapid manner in which the tanning process is completed. The only woollen fabrics of the Chinese are felt for soles and hats and a sort of rug. Their carved work in ivory, wood, and horn is exquisitely delicate. The Chinese mechanics of different trades are accustomed to form associations with certain rules and regulations, but these are submitted to voluntarily, no restraint being imposed by the state on the liberty of trade. Handicraftsmen of every trade wander through the streets of cities and villages, carrying their implements with them, ready to do every job on the spot.—The Chinese are eminently a trading people; their merchants are acute, methodical, sagacious, and enterprising, not overscrupulous as to their mercantile honesty in small transactions, but in large dealings exhibiting that

regard for character in the fulfilment of their obligations which extensive commercial engagements usually produce. The inland commerce of China is undoubtedly of stupendous dimensions. It has been asserted that there is a greater amount of tonnage belonging to the Chinese than to all other nations combined. Myriads of freight boats are constantly plying upon the gigantic network of natural and artificial water communications. To obtain accurate statistical tables on the value of the inland commerce is impossible. The principal articles of export are tea, raw silk and silk goods, straw goods, mats, porcelain and lacquered ware, fire crackers, fans, sweetmeats, rattan, grass cloth, vegetable tallow, pictures, and others which singly form only trifling items in the trade, while their aggregate value is considerable. The principal articles of import are opium, longcloths, domestics and sheetings, ginseng, tin, lead, iron in the form of bars, rods, and hoops, woollen goods, and petroleum. Tripang, birds' nests, sharks' fins, and fish maws are imported as articles of food from the Indian archipelago; precious stones and pearls from India or central Asia. Rhinoceros horns are brought from Burmah and Sumatra. Gold and silver thread is largely imported for embroidery. The importation of metals has steadily increased with the enlargement of the trade. Fine furs are chiefly brought from Mantchooria and Siberia. Among the most salable articles of foreign manufacture are umbrellas, needles, clocks and watches, cheap jewelry, telescopes, cutlery, snuff, corks, glass ware, lamps, and chandeliers. Up to 1842 Canton was the only port open to Europeans, and the intercourse was carried on through mercantile companies who had a monopoly of the trade. Since then four other ports, Amoy, Foochow, Ningpo, and Shanghai, have been made available to Europeans and Americans, and nine additional ports were added to the list by the treaties negotiated at Tientsin in June, 1858. Steamers and sailing vessels belonging to foreigners are admitted to the coasting trade and upon the Yangtse river, but they are allowed to visit only the ports named in the treaties. Foreigners can acquire land and houses at the ports, and may travel in the interior for purposes of pleasure or for trade, but must use the conveyances of the country. Produce may be brought from the interior by paying at the port of destination a duty which is equal to one half the duty upon exportation. This half duty is a commutation of the native levies exacted in the several provinces, and comprises a part of the provincial revenue. Foreign merchandise may be sent into the interior under a similar system. Opium can be brought to the ports by foreigners, but cannot be transported into the interior by them or by their agents, and after leaving the ports is subject to such duties as the authorities may see fit to impose. All duties upon goods or produce imported or exported by foreigners are fixed by treaty stipu-

lations between China and foreign powers, and cannot be varied without the consent of the latter. Foreigners are exempted from the jurisdiction of the Chinese government and made subject to the functionaries of their respective states, but may be arrested by the native authorities. At most of the ports districts are set apart for their residence, and they are permitted to establish their own regulations for the police, sanitary, and other control of their settlements. Shanghai is considered by its residents a "model settlement." It supports a considerable police force, and maintains order among about 5,000 foreign and 70,000 native residents. It has many of the attributes of a free city. The telegraph has been completed to Shanghai by two routes, *via* India and Singapore, and *via* Siberia and Japan. Some short local lines are working in the foreign settlement at Shanghai, and their operations are becoming familiar to the Chinese, who are evincing a disposition to introduce them throughout the empire. No foreign machinery has been used in the mines of China, and their processes of extracting ores and of smelting and working them are rude. The revenues derived from the trade conducted in foreign bottoms are collected by customs authorities, consisting of foreigners and natives, the former controlling. This system was introduced at Shanghai in 1855, as a means of checking the corruption of the native customs officers, and has extended to all the ports where foreigners are concerned. Mr. Robert Hart is at the head of the whole system, and is credited with being an adviser of the government in all its affairs with western states. That official deserves credit for having so managed his trust as to consult the rights of people of all nationalities, and to build up one of the most efficient customs establishments in the world. The establishment of lighthouses on the coast is chiefly due to Mr. Hart. His subordinates at the ports have been carefully chosen, and their annual contributions to the fund of information regarding their several districts are printed at the expense of the customs department. The matter printed already amounts to a considerable mass. Medical officers are employed at the several customs agencies, and their reports are also published. There are no chartered banks in China. Private banks are numerous. Insurance companies are unknown among the natives, but foreign companies at the open ports receive support from the native merchants. Paper money, formerly issued in immense quantities, is now almost unknown as a general circulating medium, excepting in the northern provinces. Loan offices and pawn-brokers' shops are numerous. The legal interest allowed on small loans is 3 per cent. per month, but among business men 10 or 15 per cent. per annum is the usual rate. The monetary system is arranged on the principle of weight, and the foreign names *tael*, *mace*, *candareen*, and *cash* are applied to the divisions,

though the cash (*tsien*) is the only native coin now current, while Mexican dollars are employed as a commercial medium along the coast. The tael (equal to 10 mace, or 100 candareens, or 1,000 cash) varies in different parts of the empire. At Shanghai the intrinsic value of a Mexican dollar is esteemed $\frac{7.25}{10.00}$ of a tael. This would make the tael about \$1.39 Mexican. The market value of the Mexican dollar fluctuates from '72 to '82; an average value is about '75. The Carolus dollar, formerly much used, passed for a considerable period as the equivalent of the tael. It is now seldom seen in China. The native bullion is called *sycee*, and the ingots weigh from 5 to 50 taels. The tael (*liang*), catty (*kin*), and pecul (*tan*) are the weights commonly employed. The catty is $1\frac{1}{2}$ lb. avoirdupois, the tael $1\frac{1}{2}$ oz., and the pecul $133\frac{1}{2}$ lbs. Of long measures, the *chih* or foot is the unit of length (according to the tariff, $14\frac{1}{2}$ inches English). It is subdivided into 10 *tsun*, and each *tsun* into 10 *fan*. The decimal division runs through nearly all the Chinese weights and measures. The Chinese mile (*li*) is 0.3576 of the statute mile. The land measures are the *mau*, *fun* ($\frac{1}{10}$ of the mau), *li* ($\frac{1}{10}$ fun), and *hau* ($\frac{1}{10}$ li). The usual mau is about 7,000 square feet; 100 mau make a *king*.—The following tables exhibit the trade of China with the countries named for the year 1871, the values being expressed in Shanghai taels (1 tael equals about \$1.40 gold). They are taken from reports published by Mr. Hart, and show the trade carried on under foreign flags at the open or treaty ports. No accurate exhibit of the trade of China can be made in the absence of data regarding that of Hong Kong, or that carried on with Hong Kong under the native flag. It should be mentioned also that Hong Kong produces nothing and consumes but little, and that the merchandise exchanged with the colony comes from or is destined for Great Britain, America, India, the Straits, &c.

COUNTRIES.	Imports.	Exports.	Total.
Great Britain.....	29,152,258	39,808,696	68,960,954
Hong Kong.....	25,876,627	12,505,499	37,882,126
India.....	20,928,023	284,110	20,157,183
United States.....	501,105	11,597,745	12,098,850
Continent of Europe.....	268,120	4,088,520	4,346,640
Japan.....	2,109,202	1,816,250	3,425,452
Australia.....	417,087	1,876,954	2,293,991
Siberia and Russia via Kiahkta.....	90	1,087,577	1,087,667
Singapore and Straits...	684,446	399,763	1,084,209
Russia (Odessa).....		445,142	445,142
Philippine Islands.....	224,811	192,959	417,770
Java.....	158,622	240,898	394,520
Siam.....	247,411	116,845	364,256
Cochin China.....	210,475	148,427	358,902
British Channel.....		382,156	382,156
British America.....	14,972	201,318	216,290
Amoor Provinces.....	136,510	19,385	155,845
New Zealand.....		106,886	106,886
South America.....		98,725	98,725
South Africa.....		27,041	27,041
Suez.....		25,754	25,754
Less reexports.....	80,414,709 2,224,616		
Total.....	78,190,098	74,860,550	158,050,648

NATURE OF THE TRADE—IMPORTS.

Opium*.....	29,261,518
Cotton goods.....	29,808,783
Woollen goods.....	4,765,876
Raw cotton.....	8,974,597
Metals.....	2,438,544
Coal.....	852,445
Seaweed and agar-agar.....	751,988
Sugar, brown.....	869,886
“ white.....	274,192
Ginseng.....	450,187
Rice.....	405,620
Birds' nests.....	385,125
Biche de mar.....	249,236
Unenumerated articles.....	4,207,651
Total.....	78,190,098

NATURE OF THE TRADE—EXPORTS.

Silk, raw and thrown.....	25,174,297
“ refuse.....	374,065
“ coarse and wild.....	294,825
“ cocoons.....	109,169
“ piece goods.....	2,352,781
“ manufactured but unclassified.....	195,169
Silkworm eggs.....	2,147
Tea, black.....	80,484,280
“ green.....	9,082,417
“ brick.....	754,495
“ dust.....	4,588
Cassia.....	892,633
Sugar, brown.....	678,412
“ white.....	269,485
“ candy.....	174,056
Mats and matting.....	514,637
China ware.....	319,923
Unenumerated articles.....	3,175,176
Total.....	74,860,550

TRADE OF THE SEVERAL PORTS.

PORTS.	Imports.	Exports.
Newchwang.....	209,866	149,006
Tientsin.....	1,344,708	1,118,767
Chefoo.....	822,737	154,942
Hankow.....	126,029	3,549,880
Kiukiang.....		81,997
Chinkiang.....		
Shanghai.....	56,967,794	40,146,448
Ningpo.....	646,197	8,849
Foochow.....	2,977,282	12,109,913
Tamsui.....	430,217	69,590
Takow.....	402,218	490,138
Amoy.....	4,289,288	2,708,106
Swatow.....	5,584,566	429,954
Canton.....	6,613,812	13,843,460
Total.....	80,414,709	74,860,550
Reexports from Shanghai.....	1,921,217	
“ “ other ports..	803,899	
Total reexports.....	2,224,616	
Net total exports.....	78,190,098	

The aggregate number of entrances and clearances of foreign vessels at the treaty ports in 1871 was 14,963; total tonnage, 7,381,557. Of the vessels 7,160, with a tonnage of 3,330,881, were British; 4,600, of 3,187,643 tons, were American; and 1,480, of 428,747 tons, were German.—The Chinese exhibit but little disposition to emigrate, and considering the vast population of the empire but few are found outside of its borders. The migration to Java, Siam, and the straits of Malacca has extended

* The value of the opium imported into Hong Kong over that imported into the open ports and stated above is 16,256,056 taels. All or nearly all of this excess ultimately reaches China.

over a considerable period. The producing class in Java is largely Chinese, and it is stated that they compose one third of the population of Bangkok in Siam. In Mantchooria the Chinese element is so great that the language of the country is dying out. In Mongolia the "labors of the Chinese farmers steal forward like a snake in the grass." Chinese traders find their way to the great marts of central Asia. Emigration to distant countries by the way of the sea has been opened within the last 25 years. The greatest flow has been to the Pacific coast of the United States, and next after that to Australia. This emigration has been perfectly voluntary in its character. That to Peru and the West Indies has been promoted by foreigners and attended with horrors scarcely second to those of the African slave trade. It is said that a ship has been burned off the Chinese coast each year for a considerable period by the coolies on board, who have preferred to meet death in this manner to being carried into a condition of slavery. The history of the race and their timid character indicate that there is no occasion for the fear that they will come to this country in great numbers. Efforts to introduce them into the southern states have proved unsuccessful. As laborers they are less vigorous than the negroes; and as the latter possess political power, they are likely to use it against the Chinaman if he becomes a competitor in the labor market. The Chinese who have gone to the regions near China have settled in them with their families; but those who have come to this country do not seem to regard it as a permanent abode, and they even send back to the mother land the bones of those who die. As a laborer, the Chinaman, though lacking vigor, is constant, and he brings to his labors an element of intelligence which produces good results. Those who worked on the Central Pacific railroad were skilfully managed and pronounced eminently satisfactory. The following table, which exhibits the Chinese immigration into the United States to June 30, 1873, is compiled from the reports of the bureau of statistics, except for the period prior to 1855, for which the figures are taken from a letter of Daniel Cleveland of San Francisco, published in the "United States Diplomatic Correspondence" for 1868:

YEARS.	Number.	YEARS.	Number.	YEARS.	Number.	YEARS.	Number.
Previous to 1851.	773	1856	4,733	1862	3,633	1868	10,634
1851.	2,716	1857	5,944	1863	7,214	1869	14,902
1852.	18,434	1858	5,128	1864	2,975	1870	11,943
1853.	4,816	1859	3,457	1865	2,942	1871	6,030
1854.	15,063	1860	5,467	1866	2,385	1872	10,642
1855.	3,526	1861	7,518	1867	3,863	1873	14,769
Total							169,034

To July 1, 1868, it is estimated that 45,887 had returned to China. The United States, accord-

ing to the census of 1870, contained 63,199 Chinese, of whom only 4,566 were females. In British Columbia there were 1,548 in 1871. Victoria contains the greater portion of the Chinese in Australia, and in that colony they numbered 17,705 in 1871. (See COOLY.)—In no country of the world is education held in higher honor than in China. Though the government fosters it only by making it the road to distinction and by supporting the various examinations (*hio-kung*), the knowledge of reading, writing, and arithmetic, to a greater or less degree of proficiency, is all but universal. But as there is no alphabet in the language, and words are represented by what may be termed arbitrary symbols, the written language is one of which more or less may be acquired, and a certain mastery of it does not presuppose the mastery of the whole. Thus a merchant may know the symbols for the articles which he sells and the numerals, so as to be able to keep his accounts, and yet have no ability to read the contents of an ordinary book. The number of adult males who can read the classical books with readiness is probably not more than three in a hundred; of women, one in a thousand. The quality of the knowledge dispensed in Chinese schools must not of course be judged by the requirements of western nations. There are four literary degrees, the first of which is called *sin-tsai* (flowering talent), corresponding to the bachelorship of arts; the second *ku-jin*, or licentiate; the third *tsin-sze*, or doctor; the fourth *han-lin*, or member of the imperial academy. The examinations which the aspirants to public honors have to pass are very severe. Bribery is sometimes, but it is believed rarely, practised to attain the degrees. The unsuccessful candidates are numbered by hundreds of thousands; they get employment as school teachers, notaries, clerks, letter writers, &c. Literary attainments are considered creditable to women, and the number of authoresses is by no means small. Printed books are cheaper in China than elsewhere, notwithstanding the clumsiness of the printing apparatus. Knowledge centres in a mere acquaintance with the aphorisms of the classics. Sir John Davis justly compares the state of the sciences among them with their condition in Europe previous to the adoption of the inductive mode of investigation. In mathematics they have made some progress since they became acquainted with European mathematical works. Astronomy has not yet been emancipated from astrology. Their geographical knowledge is mainly limited to their own country, though recently some Chinese scholars have adopted more correct ideas on this subject. A school known as the university of Peking was established in 1868, for the purpose of instructing Chinese youth in the various branches of western knowledge. The teachers are from different countries. The university has encountered many difficulties, and as yet is hardly worthy

to be dignified by the name. It however contains the elements of usefulness, and will not be neglected by the representatives of western states at the capital. The Roman Catholic missionaries have established no fewer than 25 considerable schools, one of which, at Shanghai, numbers over 300 pupils. The Protestant missionaries are doing much work of this sort. In 1872 the government sent 30 students to the United States, and 30 more are to come each year for the succeeding four years, in all 150. They are to be thoroughly educated in special branches, and are promised official employment on their return to China. A sum of about \$2,000,000 has been appropriated for the purposes of the mission. In the fine arts, the æsthetical feeling of the Chinese has been developed in a manner so peculiar as to defy all direct comparison with Christian art. While the skilful workmanship in sculpture, paintings, and architecture may justly be admired, the designs are mostly grotesque and incongruous. No higher standard seems to exist than mere mechanical skill; there is scarcely any vestige of an effort to realize the idea of the truly beautiful and sublime. Chinese artists are able to copy European works with admirable accuracy, but they do not appreciate them, or consider them as models worthy of imitation. In landscape gardening they excel, but their singular predilection for dwarfish and stunted forms mars the effect of their designs. Their music is painfully discordant to cultivated ears. They have a great many stringed and wind instruments, besides drums, bells, &c.; but of accord, rhythm, harmony, and melody they have no adequate conception. "The gong is the type of Chinese music: a crashing harangue of rapid blows upon it, with a rattling accompaniment of small drums, and a crackling symphony of shrill notes from the clarinet and cymbal, constitute the chief features of their musical performances. Their vocal music is generally on a high falsetto key, somewhere between a squeal and a scream." Dancing they set down as a branch of the dramatic art. How Europeans or Americans can enjoy dancing themselves instead of having it done by professionals is utterly incomprehensible to the Chinese mind. The drama is very popular among all classes of Chinese society, but officials are not permitted to witness theatrical performances because of the vulgarity and obscenity by which the plays are sometimes, though not generally, characterized. The actors are not respected. Women are not allowed to appear on the stage; their parts are played by beardless youths or eunuchs. Only in the northern and eastern provinces are permanent theatres to be found. The lower classes are very fond of theatrical entertainments, and, as in ancient Rome, there is no shorter road to popularity than the furnishing of gratuitous performances to the people.—Indifference to religious matters is a prominent

national trait of character. They have not even a general term corresponding to the word religion; *kiao*, the word that comes nearest to it, meaning only doctrine or creed. The lower classes are mostly professors of an adulterated kind of Buddhism, which in the lapse of time has sunk to coarse paganism and idolatry. The priests of this profession, over 1,000,000 in number, are for the greatest part ignorant and have no great reputation for virtue. They beg around the country and live in monasteries. The higher classes are either believers in the doctrines of Confucius, or in those of the philosopher Lao-tse. These are scarcely more than systems of moral philosophy clothed in a fantastical symbolism. Thus Confucius teaches that from the original substance (Tai-ki) two principles emanate: Yang, the principle of perfection, of the heavenly, of light and warmth, the masculine, symbolized by —; and Yin, the feminine principle, or that of imperfection, of the terrestrial, of darkness and cold, symbolized by —. By the combination of these symbols four images (*sz'-siang*) are presented, viz.: — — — —, corresponding to the four cardinal virtues, piety, morality, justice, and wisdom. From a double combination result eight signs (*kua*), viz.: — — — —, heaven, — — — —, moistness, — — — —, fire, — — — —, winds, — — — —, water, — — — —, mountains, — — — —, thunder, — — — —, earth. By the aid of these symbols, arranged in the form of a circle, Confucius describes the universe, and, making them to correspond with moral and mental properties, constructs an ethical system, scarcely to be styled a religion. Lao-tse (born 604 B. C., 54 years before Confucius) founded the religion of the Tao (supreme reason), which, according to him, is anterior to and the source of the divinities (Ki, Hi, Kuei) and all material forms. Like Zeno, he recommends retirement and contemplation as the most effectual means of purifying our spiritual nature. The professors of this religion (*Tao-sze*, usually rendered rationalists) believe in the existence of a spiritual world, in spiritual manifestations, and a migration of souls. There are 1,500 temples devoted to Confucius attached to the examination halls. The priests of the Tao religion live in temples and small communities with their families, or lead a wandering life, deriving a precarious livelihood from the sale of charms. They have degenerated very much, and are commonly looked upon as ignorant cheats or jugglers. The Buddhists, or the followers of Fo, have the largest number of temples, but the great mass of the people offer their prayers in any temple indiscriminately, and are perfectly indifferent to the diversities of religious denominations. "Buddhism in China," says Dr. Morrison, "is decried by the learned, laughed at by the profligate, yet followed by all." No religion is taught in the common schools. The one creed upon which all agree is the worship of deceased ancestors. The Tai-ping insurgents attempted to found a new re-

ligion, which was a curious mixture of the oldest Chinese religion and Christian doctrines; it recognized divine revelation as still continuing; its professors were fanatical and intolerant propagandists. Christianity appears to have found adherents in China at an early date. It is certain that the Nestorians had flourishing missions which began in the 7th century, and certainly existed till 1330, when they were reported to number about 30,000 souls. The first Roman Catholic mission was established by Johannes de Monte Corvino. He was made archbishop by Pope Clement V. in 1305, and seven suffragan bishops were sent to his assistance. After the final establishment of the Ming dynasty almost nothing is known of the Catholics or the Nestorians. The Catholic missions were reestablished in the second half of the 16th century, chiefly by Jesuits, and have been maintained ever since, but with varying success and influence. The Roman Catholic population of China is estimated by Huc at 700,000. The estimates of other Catholic missionaries vary from 400,000 to 1,000,000. Since the treaty with France of 1858 the Catholic congregations have received large accessions, and the church property has been greatly increased, chiefly by the recovery of estates previously seized by the government or lapsed through the hostility of the people. At the close of 1872 there were in China proper 26 vicariates apostolic and three prefectures apostolic, and in Chinese dependencies three vicariates. The first Protestant mission was begun in 1807 by the London missionary society, since when a number of other societies, English, American, and German, have sent out missionaries. The Protestant missions have been confined until lately to the open ports. In 1869 they had an aggregate membership of 5,624. A mission of the Greek church was established under Peter the Great, and in 1872 numbered a few hundred converts. The Mohammedans number many millions; there are at least 200,000 in Peking alone.—The form of government is monarchical, but not despotic, since the emperor is bound by ancient laws and customs, and could scarcely without danger disregard the advice or remonstrances of his ministers or the boards of administration. The official title of the emperor is *hwang-ti*, autocrat, as nearly as it can be translated. His real name is never used while he lives, but the period of his reign has a special name expressive of its character and tendencies. The emperor designates himself by the terms *kua-jin*, the solitary or unequalled man, and *kua-kiun*, the solitary prince. His throne is called "the dragon's throne." Like all oriental princes, his person is venerated in an extreme manner. He never appears in public unless preceded by a large body guard. His courtiers and chamberlains are for the most part eunuchs, of whom perhaps 1,000 are connected with the palace. He has one legitimate wife (*hwang-hoi*, empress), two wives of an inferior rank

(*fu-shin*, queens), and a great number of concubines. The emperor makes choice of his successor from among the sons of his three wives, but the selection remains a secret until his death. The daughters are married to Mongolian or Mantchoo princes. Every succeeding generation of the imperial offspring stands one grade lower in the ranks of nobility, until at the seventh remove they belong to the people at large, but are governed by a special board called board of the imperial clan. Only the highest classes of princes are obliged to live at court. Besides this nobility of birth, there is a personal dignity generally connected with official rank, to which every one has access irrespective of birth. The five ancient degrees of dignity are *kung*, *han*, *pe*, *tse*, and *nan*, sometimes rendered duke, marquis, earl, viscount, and baron. The mark of official nobility is the peacock's feather. Titular rank is sold to ambitious individuals, in the same manner as official titles, such as aulic councillor, secret councillor, &c., in some German states. The civil mandarins number about 15,000, the military about 20,000. Each are divided into nine classes, and rank alike. Officials of the first rank wear a ruby placed on the apex of the hat; those of the second a red coral button; those of the third a sapphire; those of the fourth a blue opaque stone; those of the fifth a crystal; those of the sixth a white shell button; those of the seventh one of plain gold; those of the eighth one of worked gold; and those of the ninth one of worked silver. There are additional indications of rank embroidered on the garments worn, which differ in the civil and military grades. The administration of the imperial government is complicated. A cabinet (*nui-kau*), consisting of four chief chancellors and a number of assessors, has the general superintendence and legislative regulation of the country. Two of the members of this board are Mantchoos and two Chinese. The former have a veto upon the latter. The emperor himself takes a prominent part in the labors of this board. Of late a portion of its powers has been vested in a cabinet council of five members only (*kiun-ki-chu*), which corresponds to the ministry of western nations. Its members are selected by the emperor from the functionaries of the highest rank. The duties of these supreme councils are general, comprising matters relating to all departments of the government. The principal executive bodies under them are the six boards (*luh-pu*), viz.: 1, board of civil service (*li-pu*); 2, board of revenue (*hu-pu*); 3, board of rites (*li-pu*), or imperial household, court matters, and diplomacy; 4, board of war (*ping-pu*); 5, board of justice (*hing-pu*), performing also the functions of a supreme court of appeals (*ta-li-se*); 6, board of public works (*kung-pu*). Each department has two presidents, four vice presidents (one half Chinese, the other Mantchoos), and three subordinate grades of officers (directors, under-secretaries, and controllers), besides

a great number of clerks; but no board is entirely independent of the others in its acts. An institution peculiar to China is the censorate (*tu-cha-yuen*, i. e., all-examining court), whose duty it is to examine all official acts of the ministry and cabinet, to institute inquiries, raise objections to such measures as they deem detrimental to the best interests of the country, and even to stop them entirely. They are bound to give a hearing to every subject who has cause to complain of any act of government. The office, in its practical working, is somewhat similar to that of the tribunes of the people in ancient Rome, and may be considered a substitute for popular representation. At least, the privilege of reproof even the doings of the emperor has often been exercised by the censors with candor and plainness. The administration of the vassal states and foreign affairs is separate from that of the empire proper. It is intrusted to the *li-fan-yuen*, usually called the colonial office. Since the treaties of 1858 a separate office for the transaction of business with the western states has been established; it is known as the *tsung-li yamen*. The provinces are divided into prefectures or departments (*fu*), each containing an average population of 2,000,000; the prefectures into districts (*chai-u*), and the districts into *hien* or sub-districts. The larger provinces are administered each by a governor general (*tsung-tu*) or viceroy, while of the lesser ones there is but one viceroy for two or three. Each province has besides a governor. At the head of the departments are intendants of circuit, at the head of the districts magistrates, and at the head of the *hien* petty officers who are charged with the enforcement of order, the collection of taxes, &c. Special imperial commissioners (*kin-chai*) are constantly sent to all parts of the empire to take a general surveillance. Governors general are appointed for three years; their powers are limited by those of a provincial cabinet, consisting of the governor, the military commandant, the provincial treasurer, and the chief justice of the province. According to the "Red Book" there are 8 governors general, 15 governors, 19 treasurers (2 in Kiangsu), 18 provincial chief justices, 17 literary chancellors, 15 military commandants, and 1,740 intendants or magistrates. The number of petty subordinate officers is immense. The whole forms the most stupendous bureaucracy in existence. The municipal government of Peking is a part of the general government. All public offices are open to those who have been successful in the literary examinations, without any distinction of birth, nationality, or creed. The salaries of all public officers are comparatively low, and hence corruption prevails among them. While governors general sometimes make millions of dollars in this way, even the pettiest subordinates may make their hundreds and thousands. Yeh, being questioned how much he paid to his secretaries, replied that their

salary was 100 taels (\$140) a month, but that they made three or four times as much by perquisites. The ordinary salary of a governor general is 20,000 taels, of a lieutenant governor 16,000, of a treasurer 9,000, of a provincial chief justice 6,000, of a military governor 4,000, of a general 2,400. The revenue of the central government cannot be ascertained by foreigners with any degree of accuracy, but it is much less than might be supposed. The estimates vary from \$180,000,000 to \$440,000,000, and even the latter amount would only be at the rate of a little over \$1 for every inhabitant. The taxes are partly paid in kind and partly in money, thousands of canal boats being constantly employed to carry the rice and grain collected from the farmers to Peking. According to Dr. Medhurst, \$42,327,954 land taxes in money, and \$12,692,871 in grain, are sent to Peking, while \$38,273,500 in money and \$105,689,707 in grain are kept in the provinces. This, with the revenue derived from customs and transit duties, which is set down by Dr. Medhurst at not over \$1,974,662, would give a total taxation of \$200,958,694. But there are other sources of revenue, such as the duties on salt, license money, stamp tax, government monopolies, mining, pearl fishery, the manufacture of gunpowder, &c. China has no public debt. Extraordinary sources of revenue, resorted to when necessity demands it, are sales of office and honors, temporary increase of duties, and contributions from the rich. The laws of China are collected into a general code (*Ta tsing liuh li*, i. e., statutes and rescripts of the great pure dynasty), and arranged under seven heads, viz.: general, civil, fiscal, ritual, military, and criminal, and those relating to public works. In theory this code might be considered as a sort of constitution of the empire, but in practice the high provincial officers frequently supersede it by issuing edicts upon matters that have been provided for already by law, or by reviving some old law, or by forced and arbitrary application of existing laws to special cases. The edicts are placarded in the cities and towns, and the more important ones circulated in pamphlet form. However excellent many of the written laws may be, their execution is by no means such as to give the people at large the benefit of them. Innumerable cases of judicial murder, extortion, and crime are reported in the Peking "Gazette," and the code recognizes cases of oppression and tyranny in which open rebellion of the subjects against the officers of the government would be justifiable. The cruelty of the tortures by which the magistrates sometimes seek to obtain confessions almost surpasses belief. The treatment of prisoners, who are caged like wild beasts, is barbarous in the extreme. Flogging (from 10 to 300 blows), transportation, perpetual banishment to remote provinces, slavery (hard labor), and death are the legal punishments of crime; im-

prisonment is regarded only as a corrective. Decapitation and strangling are the legal modes of executing criminals, the more cruel modes of quartering, flaying, starving to death, &c., having fallen out of use almost entirely. It is believed that the number of criminals who undergo the penalty of death is not one half of those who die from the effects of torture and imprisonment. The trials are held in public; they are brief and free of cost; no counsel is allowed to the criminal. Appeals to higher courts are frequently resorted to. Sentences of death require the signature of the emperor, but this form is dispensed with by a fiction of the presence of the emperor in every public office.—The military organization is very defective. As a general rule, the Chinese hate war, and do not consider superiority in military power an attribute of a higher order of civilization, though they esteem personal courage and praise their ancient heroes in songs and novels. "China owes her advance in numbers, industry, and wealth mainly to her peaceful character and policy." A standing army has existed since the 7th century. The soldiers in time of peace live in garrison in the large cities; they are poorly paid, and badly armed and equipped. There is nothing imposing about them except their numbers. The infantry carry matchlocks of the clumsiest kind, or spears, bows, swords, and bucklers; the cavalry, helmets, cuirasses of quilted and doubled cotton cloth, covered with iron plates or brass knobs, bows and arrows, and shields of strong wickerwork. The artillery have cannon of iron and brass of a heavy calibre, but scarcely know how to use them. The jingall, a kind of swivel resting on a tripod, is the most effective light arm the Chinese possess. Of late years the government has shown a disposition to adopt the weapons and the military methods of western states. In 1860–'61 Gen. Ward, an American, drilled a force of 2,500 Chinese after the foreign style. They were armed with foreign muskets, and dressed in a half-foreign costume. This organization was enlarged under Burgevine, another American, and Col. Gordon of the British army, and was very successful in expelling the Tai-ping troops from the province of Kiangsu. Some French officers drilled a similar force in the Chekiang province, and operated against the Tai-pings with like success. Arsenals, so called, have been established at Shanghai and Foochow. In each of these upward of 1,000 natives are employed under the supervision of foreigners. Firearms of all kinds are successfully made, and each establishment has built and launched four or five war vessels, some of them of nearly 3,000 tons burden. The want of courage of the Chinese soldiers has been proverbial, yet it is not without honorable exceptions. The Tartar garrison of the Pei-ho forts stood their ground with firmness in May, 1858; and there were many instances of daring exhibited by the native troops during the suc-

ceeding campaign. Gen. Ward used to say that he could take his disciplined corps where no white troops would go. It is likely that in case of another foreign war the Chinese government, having considerable supplies of improved arms and a knowledge of the foreign methods of warfare, would be able to make a much better contest than heretofore. A French officer, M. Giquel, in a recent book says that it would not be safe to undertake a contest with China with a smaller force than 40,000 men. The regular army, or the eight banners of Mantchoos, consists of 67,800, or, according to De Guignes, 100,000 Mantchoos, 21,000 Mongolian Tartars, and 27,000 Chinese. The pay of a foot soldier is from \$3 to \$4 a month, of a horseman about \$5. The green banner, or militia, numbers 700,000 men, mostly farmers and mechanics, wholly unfit for a serious conflict. Besides these, there are some irregular corps, bringing the total nominal figure of the army up to 1,230,000. Of so-called fortresses China has not less than 1,193, but only a few of them are built in a substantial manner and able to withstand a cannonade, while the rest consist merely of a common wall and ditch. The great wall (*wan-li-chang*, i. e., the myriad-mile wall), on the N. frontier of China proper, is the most gigantic work of defence ever erected by man. It was originally built as a bulwark against the invasions of the Tartars (215 B. C.). It runs from a point on the coast of Liautung, lat. 40° 4' N., lon. 120° 2' E., in a westerly direction, to the Yellow river, in lat. 39½° N. and lon. 111½° E.; thence to lat. 37° N., and again in a N. W. direction to its termination in lon. 99° E. and lat. 40° N.; making 21 degrees of longitude, and with its windings a length of 1,250 or 1,500 m. In some places it is a simple rampart, in others a solid foundation of granite, while the eastern section has a height of from 15 to 30 ft., and a breadth such that six horsemen may ride abreast on it. There are brick towers upon it at different intervals about 40 ft. high. The navy has heretofore consisted of 1,951 war junks, entirely similar to trading vessels, and in no way able to withstand the means of modern maritime warfare. The whole number of vessels of the foreign style now (1873) in use as war vessels is about 20. These are placed under the control of provincial officers, and are supported from the several provincial treasuries. Foreigners have heretofore been employed to command these vessels, and to superintend their engines; but of late nearly all such have been dismissed. It is quite certain that they would in case of war fall into the hands of the enemy, and form a source of danger rather than of support to the government.—The history of China dates back nearly 5,000 years, but up to the year 2207 B. C. it bears a mythical character. The Chinese myths begin with the reign of the Tien-hwang, Ti-hwang, and Yin-hwang (the celestial, the terrestrial, and the human rulers). After them, Fuh-hi,



Great Wall of China.

who in the old legend appears also as a demigod, became the founder of the Chinese empire (2852). He is said to have taught the people cattle-raising and writing; to have introduced the divisions of the year, the institution of marriage, &c.; and to have died at the age of 200 years, after a reign of 115 or, as some accounts say, 164 years. His successor, Shin-nung, during a reign of 140 years, introduced agriculture and medical science. The next emperor, Hwang-ti, is believed to have invented weapons, wagons, ships, clocks, and musical instruments, and to have introduced coins, weights, and measures. His third successor, Ti-ku, established schools, and was the first to practise polygamy. In 2357 his son Yau ascended the throne, and it is from his reign that the regular historical records (*Shu-king*) begin. A great flood which occurred in his reign has been considered synchronous and identical with the Noachic deluge, and to Yau is ascribed the merit of having successfully battled against the waters. His reign lasted from 2357 to 2258, during which time he organized the political system of the country on a firm basis, fostered agriculture, industry, and commerce, built canals, roads, &c. His son and successor, Shun (2255-2207), ruled in the same spirit. So far, if the old traditions are to be relied upon, China enjoyed a golden age of national felicity. The beginning of the later history of China inaugurates a series of internal broils, revolutions, wars, and changes of dynasty. The immobility which is generally supposed to be the prominent characteristic of China does not appear in the history of her dynasties. The dynasty of Hsia (2207-1767) was founded by Yu the Great, who was the first to unite supreme ecclesiastical power to the temporal authority. His grandson was dethroned by a popular revolution in

favor of his brother Chung-kang, who held the reins of government with a vigorous hand. Shan-kang succeeded to the throne after a period of war, and by him and his son Ti-chu the country is said to have been well governed. Thereafter the dynasty degenerated until it was expelled by a popular movement, and replaced by the dynasty of Shang or Yin, which gave 28 rulers to the country (1766-1122), most of them vicious and cruel. The last one, Chowsin, terminated his miserable career in the same way as Sardanapalus. Wu-wang, the general who had succeeded in overthrowing him, became the founder of the dynasty of Chow and the regenerator of the empire. His dynasty ruled for a period of 873 years, the history of which is an almost uninterrupted catalogue of feuds, revolutions, wars with the Tartars, usurpations of princes and provincial governors. During the reign of Li-wang (571-544), the principal disciple and expounder of Confucius, Meng-tse (Mencius) was born. The dynasty of Tsin (249-202) restored the unity of the empire by resubjecting the vassal states which had obtained independence under the preceding weak rulers. Ching-wang (246-210) erected the great wall for the protection of the empire against the incursions of the Tartars, and assumed the title of *hwang* or emperor. Under the name of Tsin-chi hwang-ti, he is celebrated as the national hero of China. In order to destroy all traditions of the former political institutions, he decreed that all books treating of them should be burned. The writings of Confucius and Mencius were among them, a few fragments of which only could be found afterward. The dynasty of the Han (206 B. C. to A. D. 220) gave to the country the emperors Wen-ti (180 B. C.), the restorer of the ancient literature; Wu-ti (141), a great patron of

science and art; Siuen-ti (73), who subjected the Tartar country as far as the Caspian sea; Ming-ti (A. D. 58-76), under whose reign the Buddhist priest Ho-shung, from India, introduced the Buddhist creed, while the apostle Thomas is believed by the Armenian Christians to have been in China; and Ho-ti (89-106), who introduced the culture of the grape. About A. D. 200 a Roman embassy is said to have come to China. From 220 to 260 the empire was divided into three kingdoms, which were reunited by Wu-ti, the founder of the second dynasty of the Tsin (260-420). The Tartars, who had been kept in check by the former dynasty, now obtained a firm foothold in the northern portion of the empire, where they established an independent kingdom (386). Four dynasties (Sung, Tse, Liang, and Chin) ruled the southern empire till 590, a period replete with domestic wars, religious dissensions, and palace revolutions. In 590 the prince of Sui, having subjected the Tartar kingdom, conquered also the southern empire and reunited them. He was a wise ruler, a promoter of science, education, industry, and commerce. During the dynasty of the Tang (619-907) Christianity was preached by the Nestorian, Olopen (636). The emperor Kow-tsung extended his conquests to the boundaries of Persia. His son Tai-tsung was the Charlemagne or Haroun al-Rashid of China. His successors became abject tools of their eunuch courtiers (9th century), who were destroyed by Chow-tsung (890), but too late to save the dynasty. Once more the empire was torn by the feuds of contending dynasties, and the Tartars, whose relation to the Chinese empire was strikingly similar to that of the German tribes to the declining Roman empire, increased in power and importance. Tai-tsu, the founder of the dynasty of the Sung, and his successors (960-1279), under whose reign the arts and sciences flourished, were unable to keep the Tartars down. They were compelled to seek the aid of one tribe against another, but were in turn assailed by their allies, until the Mongolians overran the empire. Genghis Khan advanced on Peking in 1215. Kublai Khan (Chinese, *She-tsu*) established the first Mongol dynasty in China, having Peking as the capital city (1279-1368). The last emperor of the Sung dynasty drowned himself and family near Canton. The conquerors did not attempt to change the national customs and institutions, but favored Buddhism. Kublai conquered Cochín China and Tonquin. In his reign the European traveller Marco Polo came to China. In 1294 the first Roman Catholic missionaries appeared at Peking. In 1342 a famine having destroyed 13,000,000 people, a general revolution broke out. In 1358 a Buddhist monk of low birth, Chu Yuen-chang, assumed the lead of the revolution, overthrew the Mongolian dynasty, and ascended the throne under the name of Hung-wu. His dynasty (Ming) lasted 276 years (1368-1644), and gave to the country 16 rulers, most of them

efficient. About the middle of the 15th century the Tartars again invaded the empire, but were repelled. The invasions of the Mantchoos commenced under the reign of Shi-tsung (1522-1567). About the same time the Portuguese began to trade with the neighboring islands. In 1583 the Italian Jesuit Ricci was allowed to preach Christianity in China, and by conforming it in many respects with the traditions of Confucius he made many converts, even among the mandarins. In 1604 the Dutch sent three vessels to China, but were not admitted. When, in 1622, they tried to enter the empire by force, they were defeated; still they succeeded in establishing themselves on one of the Pescadore islands, which they afterward exchanged for Formosa. In 1615 the Mantchoos, exasperated in consequence of the assassination, by order of the Chinese emperor, of their king, had commenced hostilities, and when in 1635-'44 the empire became again the theatre of bloody internecine wars, they took sides with the defeated imperial party against the insurgent usurper Li-tse-ching, defeated him, entered Peking, and proclaimed Shun-chi, the youthful son of their own king, emperor of China. He was the founder of the present Mantchoo dynasty, which has succeeded well in overcoming the strong national antipathies of the Chinese. In 1653 the Dutch were once more refused admission, while the Russians were allowed to trade with the northern portion of the empire. Shun-chi was educated by the German Jesuit Adam Schall, who, as president of the board of mathematicians, became in fact the prime minister. In 1661 Kang-hi succeeded to the throne. He conquered Formosa and Thibet, improved the financial condition of the government, promoted science and literature, established schools and colleges, had the different provinces of the empire surveyed and mapped by Europeans, and restored the Christian churches to the missionaries (1671). Two Frenchmen, Gerbillon and Bouvet, were his favorite advisers. During his reign the city of Peking was destroyed by an earthquake, when, according to native accounts, 400,000 perished among the ruins. Yung-ching (1722-1736) expelled the missionaries from the schools, in consequence of his suspicions of their designs and dislike of their overbearing conduct. His son Kien-lung (1736-1796) extended his dominion over the largest portion of central Asia. Although in general just and well meaning toward his subjects, he for a time persecuted the Christians, and turned a deaf ear to the requests of European powers (Russia excepted) to be admitted to commercial intercourse with China. His successor Kia-king (1796-1820), a voluptuous and cruel monarch, was unable to check the anarchy created by insurrectionary movements against his tyrannical rule. In 1807 Mr. Morrison, the first Protestant missionary, came to Canton, translated the Bible into Chinese, and in conjunction with Mr. Milne established the

Anglo-Chinese college at Malacca. In 1820 Tau-kwang ascended the throne (died Feb. 24, 1850). The most important event of his reign was the first war with Great Britain, known as the opium war. The British, having sent an unsuccessful commercial expedition against China as early as 1596, did not obtain a foothold in that country until the end of the 17th century. An embassy which they sent to Peking in 1793 under Lord Macartney was kindly received. The embassy of Lord Amherst in 1816 was not admitted into the presence of the emperor. The refusal was probably occasioned by Lord Amherst's unwillingness to perform the *kotow*, and did not result in any interference with the course of trade. Until 1834 commercial intercourse was conducted by the East India company. In that year their charter ended, and Lord Napier was sent out by the British government to superintend the trade. He endeavored to communicate with the viceroy at Canton by letter and on terms of equality. This was refused, and led to the bringing up as far as Whampoa (12 miles below Canton) of two frigates, which received and answered the fire of the forts at the Bogue (Sept. 11, 1834). On Sept. 21 Lord Napier retired to Macao, where he died three weeks later. After this trade was carried on without the immediate superintendence of the British officials till 1837 (April 12), when Capt. Elliot, the British commissioner, went to Canton under an agreement with the viceroy, which was a virtual abandonment of the position taken by Lord Napier, and acknowledgment of Chinese superiority. Capt. Elliot justified his action by a statement that the relations between the Chinese authorities and the merchants were in a precarious condition. This condition arose out of a discussion as to whether the trade in opium, which had been carried on in an illicit manner, should be legalized, and there was danger that the government would not only decide the question unfavorably, but take some active measures to put down the traffic. Such a decision was subsequently reached, and in the autumn of 1837 Capt. Elliot was directed by the viceroy to drive away the opium vessels, and to notify his government that they must not come again. The trade went on, however, under greater or less restrictions and difficulties, until the early part of the year 1839, when a special commissioner named Lin appeared with strenuous orders to thoroughly suppress it. One of his first steps was to demand the surrender of all opium. This order was complied with, and Lin was directed by his government to destroy it. The whole quantity, 20,291 chests, valued at about \$10,000,000, was placed in trenches, mixed with lime, and sea water admitted, a procedure by which the desired result was most perfectly accomplished. This measure did not however suppress the trade. More opium arrived and was sold clandestinely. In consequence of the continued irritation and

the persistent efforts of the commissioner to suppress the traffic, the British residents were withdrawn from Canton, and afterward from the Portuguese colony of Macao, and on Dec. 6 trade with the English was declared at an end. These circumstances led to the war of 1840-'42, known as the opium war. The British forces appeared off Macao June 22, 1840. On July 4 the island of Chusan, off the mouth of the Yangtse river, was occupied. Simultaneously the ports of Amoy and Ningpo, and the mouths of the Min and Yang-tse rivers were blockaded. The British plenipotentiaries proceeded toward Peking, and on Aug. 11 anchored off the mouth of the Pei-ho river. The Chinese officer Ki-shen met them there, and it was arranged that the discussion of matters at issue should be referred to Canton. Negotiations were continued at Canton as arranged for, and a treaty was effected. It was not ratified by the Chinese emperor, and on Feb. 19 hostilities were resumed, and the British fleet moved up to the city of Canton. On the 26th the Chinese paid a ransom of \$6,000,000, and the British prepared to leave their investing lines. The evacuation was very soon completed, and trade was reopened and continued throughout the war, which was prosecuted in the north. Amoy was captured on Aug. 27, Chusan was occupied a second time on Sept. 29, and Ningpo on Oct. 13. Desultory operations continued throughout the winter. In May, 1842, Chapoo was captured, and on June 16 and 19 Woosung and Shanghai respectively were occupied. In the latter part of July Chinkiang was invested and captured, and the forces moved to Nanking, 40 m. beyond Chinkiang. The native authorities, anticipating the loss of their ancient capital and thoroughly humbled by the events of the war, sued for peace, and a treaty was effected. This treaty provided for: 1, lasting peace between the two empires; 2, an indemnity from China of \$21,000,000 (\$12,000,000 being for expenses of the war, \$3,000,000 for debts due British subjects, and \$6,000,000 for the opium destroyed); 3, the ports of Canton, Amoy, Foo-chow, Ningpo, and Shanghai to be opened to trade; 4, Hong Kong to be ceded to the queen; 5, British prisoners to be unconditionally released; 6, Chinese who had been in British service to be held guiltless; 7, correspondence to be conducted on terms of equality; 8, the forces of Great Britain to occupy Chusan and Amoy until \$6,000,000 should be paid. On Feb. 24, 1844, Mr. Caleb Cushing arrived in China as commissioner of the United States, and without difficulty he negotiated a treaty which was signed July 3, 1844, at Wanghia near Canton. A treaty with France was signed Oct. 23.—The relations of foreign states with China moved along for several years with varying phases of friendliness and hostility. At the northern ports the people were generally friendly. At Canton, which had been spared from military occupation by

the British, and where the population is more turbulent than elsewhere along the coast, difficulties with foreigners were continually occurring. The great fact upon which the danger of the situation depended was that a satisfactory basis of intercourse had not been reached. Foreigners, coming as they did from states of advanced power and civilization, were unwilling to take up an inferior position before the Chinese. The emperor and his officials claimed for China the sovereignty of the world, and that it was by his august sufferance alone that intercourse was permitted. Many of the officials entertained a more or less just sense of the intelligence of foreigners and of the advantages to be derived from commerce; but Chinese officials are invariably time-servers, and they could not enter upon the task of enlightening the central government. At length it became manifest that a war would be needed to effect more satisfactory relations. The pretext for military operations was the seizure of the Arrow, a vessel of Chinese construction registered in Hong Kong under a colonial ordinance. On Oct. 8, 1856, a party of Chinese constabulary boarded this craft, tore down the British flag, and carried away the crew, who were Chinese. The British consul informed the viceroy of what had been done, and demanded the return of the men and a disavowal of the act of the constabulary. The viceroy returned the men, but refused to apologize. Further correspondence ensued, but a satisfactory result was not obtained, and the British authorities proceeded with such force as was available to active hostilities. It will appear strange to the reader that such operations should be entered upon by the British representatives without reference to the home government. It is to be remembered, however, that the Chinese government had persistently refused to receive on terms of equality the representatives of western states, and that the intercourse of foreign officials was carried on with the provincial authorities. There was no way to reach the imperial government excepting through these, and a petty war with them was the only recourse excepting a general war with the empire. During the preceding years since the establishment of relations at Nanking, these local operations had not been infrequent, and had resulted favorably as a rule without being carried further than a mere demonstration of force and of a determination to procure redress. The operations of the British forces at this time resulted in the capture of various forts near Canton. The viceroy, so far from yielding under this pressure, appeared disposed to defy British power, and proceeded to offer a reward for British heads, \$30 at first, and afterward \$100. An attempt to poison residents at Hong Kong followed. The running warfare thus opened was kept up for several months, the advantages resting with the Chinese rather than with the British. Meanwhile the situation was receiving the attention of the

government of Great Britain, and it determined to secure a satisfactory settlement, at the expense if necessary of a second war. The French government, actuated by a sense of the difficulty of conducting relations with China under the existing system, and having various grievances, concluded to join in an expedition intended to demand satisfaction and to enforce more satisfactory relations. The American and Russian governments held that they had no special ground for complaint, and, while sending out special ministers, gave them pacific instructions. It is a matter of history that the American envoy, who entered upon his mission with a disposition to deprecate the course of England and France, felt constrained at a later moment to admit that it was justified by all the circumstances, and that it would have been wiser for his country to unite in the effort to effect more satisfactory relations. An expeditionary force left England in the spring of 1857, but was diverted to India to aid in the suppression of the mutiny. Toward the end of the year a portion of the force reached Hong Kong, and Lord Elgin, with the support of Baron Gros, the French commissioner, was able to present an ultimatum to the viceroy. The response was deemed unsatisfactory. The bombardment of Canton by the allied British and French forces commenced Dec. 28, and the city was occupied the next day. The force engaged on the British side was about 5,000 men, the French 900. The combined losses were 10 killed and 100 wounded. The Chinese loss was perhaps 250. There was no lack of disposition to hold the city on the part of the Chinese, and many indications of valor on their part were shown. The speedy and comparatively bloodless capture of a city of more than a million inhabitants, in face of their best efforts to hold it, must be attributed simply to the superior organization, armament, and *morale* of the attacking forces. The viceroy Yeh was detained by the British authorities. The control of its inhabitants was necessarily confided to the native governor under the supervision of a commission of British and French officers. It has been mentioned in the notice of the war of 1840-'42 that trade with Canton was continued while military operations were prosecuted in the north. So in this instance, the allies while holding Canton permitted trade to take its usual course. The several foreign representatives at this stage of proceedings met by arrangement at Shanghai, and united in a request to the government at Peking to send to that city a high commission with full powers to discuss the situation, and to effect more liberal treaties. Responses to these several letters were received in due course. The government, so far from acceding to the request for the appointment of a special commission, declared that Yeh had been degraded and that Hwang had been appointed in his stead, and enjoined the several envoys to repair to Canton. The latter

considered the response unsatisfactory, and determined to proceed toward Peking without delay. The advance of the combined fleet of the allies and of the Russians and Americans arrived off the Pei-ho about the middle of April, 1858, and soon afterward the envoys again despatched letters to the government requesting the appointment of a plenipotentiary. An answer was received to these notes indicating that certain officers had been named by the government; but as it did not appear that they possessed full powers, the envoys declined to communicate with them, and declared their intention to proceed toward the capital. After a delay of several weeks, the allies bombarded the forts at the mouth of the Pei-ho, and stormed them. The Chinese made no adequate resistance, and these strongholds were occupied with but few casualties. No time was lost in reaching Tientsin, 50 m. above the mouth of the river. Here the envoys were met in June by Kwei-liang and Hwa-shana, plenipotentiaries of the Chinese government. On the 14th the Russian treaty was signed, and on the 18th the American. The British treaty, much fuller in its scope, was signed on June 26, 16 years after the treaty of Nan-king, and the French the next day. These latter treaties stipulated for the residence of ministers at Peking, for the opening of additional ports, for travel and trade under restrictions in the whole empire, for the navigation of the Yangtse river, and for the settlement of the transit-dues question. Four millions of taels (about \$5,500,000) indemnity was provided for in the British treaty, and a smaller sum in the French. The British envoy, taught by experience to anticipate evasions by the Chinese government, insisted upon the ratification of his treaty before leaving Tientsin, and received within a few days the imperial decree. It contained also the ratification of the other treaties. Treaties of amity and of commerce were thus concluded, but the very moment when elsewhere difficulties would have been at an end, was signalized by hostile conduct on the part of the native troops at Canton. So serious were these, and so peculiar were the relations of foreign states with China, that Lord Elgin did not hesitate to advise the British commander-in-chief to undertake at that point vigorous action, "showing our power to control and punish the braves." Mr. Bruce, afterward Sir Frederick Bruce, was appointed by the British government minister to China, and in the early part of the year 1859 proceeded on his mission. At Hong Kong he was met by a report that the imperial government was hostile to the treaty concluded by Lord Elgin, and was making war-like preparations at the mouth of the Pei-ho. At Shanghai he received letters from the imperial commissioner Kwei-liang and his associates urging him to remain in that city for the discussion of measures which they said had been left undetermined by Lord Elgin. Mr.

Bruce believed these representations were intended only to procure delays, and determined to proceed north in order to exchange the ratifications of the treaty. The French and American ministers were met by similar representations, and regarded them in the same way. On arriving off the mouth of the Pei-ho the river was found to be well fortified, and every incident corroborated the information received at Hong Kong that the emperor would not accede to the expectations of the envoys without pressure. On June 25 Mr. Bruce received a letter saying that the imperial commissioners had been recalled from Shanghai, and would be directed to accompany him to Peking. As some time would elapse before their arrival, he was requested to wait at the anchorage, and informed that the governor general would at the right moment go to his vessel and conduct him to the mouth of the Pehtang river, a small stream 10 m. N. of the Pei-ho, from whence he could proceed to Peking by land. The letter was considered unsatisfactory, as indicating an unusual and disagreeable route to the capital, and because the name of her majesty was not put on a level with that of the emperor. Thereupon Admiral Hope, in command of the British forces, attempted to force the passage of the Pei-ho, but was defeated with a considerable loss. The British and French ministers retired to Shanghai to await instructions. The American minister, Mr. Ward, whose treaty contained no essential clauses not embraced in Mr. Cushing's treaty of 1844, concluded to proceed by the route indicated by the Chinese. He disembarked with his suite at Pehtang on July 20, and was conducted in the rude carts of the country to the Pei-ho above Tientsin, thence in boats to Tungchow, 12 m. below Peking, and from that point to the capital in carts. He was here treated with a show of consideration, but was denied an interview with the emperor unless he should perform the *kotow*, and finally was obliged to exchange the ratifications at Pehtang. Mr. Ward on his return to Shanghai informed Mr. Bruce that he was "more convinced than ever of the soundness of his (Mr. Bruce's) determination to proceed to Tientsin under his own flag, and of the accuracy of the information as to the unreasonableness of the court and the influence gained by the anti-foreign party in the emperor's counsels." The British government received the information of the occurrences at the mouth of the Pei-ho in a spirit which must commend itself to every student of history, and to every one who has at heart the dignity and honor of the West in its relations with eastern exclusiveness and arrogance. Their minister was directed to demand a formal apology for the act of the Chinese troops at the mouth of the Pei-ho, to receive any friendly overtures thereafter in a conciliatory spirit, but to decline any ceremonial unless it should recognize the equality of his government; and he was at

the same time informed that the government would make such arrangements as might be necessary to enforce acceptance of the terms offered to the Chinese emperor. The French government received information of what had occurred in the same spirit, and entered upon similar preparations to enforce their views. The ultimatums of the two governments were addressed to the Chinese government in March, 1860, and in April the response was received flatly refusing the demands of the allies. Lord Elgin and Baron Gros reached Shanghai in June as special ambassadors of their respective governments. The month of July was occupied with preparations for the approaching campaign. On Aug. 1 a force of 5,000 men was landed by the allies at Pehtang, which was found to be deserted. The Pei-ho forts were taken from the rear on the 21st, and Tientsin was occupied without resistance on the 24th. At this point imperial commissioners appeared, who declared that they had full powers and presented them. A negotiation ensued, which resulted in the preparation of a treaty; but at the last moment the commissioners stated that they could not stipulate that the convention would take effect without previous ratification. The ambassadors could only attribute this action of the commissioners to a design to create delay, and determined to march against the capital. While the allied forces were moving forward, other representations were received which led to further negotiation, and to an arrangement that the troops should halt at Tungchow, where conferences, which it was hoped would be final, should be held. Mr. Parkes and others were sent forward to this town to agree upon a place for an encampment, the means of procuring supplies, &c. While in the prosecution of their work they were arrested and detained under circumstances of indignity and cruelty. At the same moment the allied troops were met by indications of a determination to resist their progress, and a battle followed in which the Chinese were routed. The treacherous treatment of Mr. Parkes and his associates left the allies no alternative but to proceed against Peking, in front of which city they arrived on Oct. 6. Mr. Parkes and some others of those captured with him were finally given up on the 9th, but several Englishmen were killed by ill usage and horrible and protracted cruelty. One of the gates of the city was surrendered to the allies on the 13th. On the 24th a convention of peace, in terms nearly identical with that of the articles prepared a few weeks before at Tientsin, was signed, and the ratifications of the treaty of 1858 were exchanged. The next day a convention with France was signed, and the ratifications of the French treaty of 1858 were exchanged. An incident of this war which deserves mention is the destruction of the imperial summer palace. It has been condemned as an unnecessary and wanton act, and has drawn forth the severest strictures in this country. The defence made by Lord Elgin is that the treatment of Mr. Parkes and his comrades deserved signal punishment, and that no other course would have so effectually humbled the government with so little harm to the people. Twenty-six British subjects carrying a flag of truce had been seized in defiance of honor and of the law of nations. Thirteen only were returned alive, all of whom bore marks of the indignities and ill treatment from which they had suffered; the others were barbarously murdered. The destruction of a palace was surely no undue retaliation for guilt so great. The death of the emperor occurred soon after the close of the war. The heir to the throne was under age, and a regency was established, which ended Feb. 23, 1873, by his assumption of power. During this interval the actual condition of the empire was greatly improved, and foreign relations were undisturbed. The more salient events were the suppression of the great rebellion, the close of the two Mohammedan rebellions, the despatch of the embassy of which Mr. Burlingame was the chief, and the Tientsin massacre.—The great rebellion, generally known as the Taiping rebellion, broke out in southern China in the year 1850. The British war of 1840-'42 had destroyed the prestige of the imperial government. There had been repeated failures of crops in the districts where it originated, and such failures are frequently the cause of outbreaks in China. Hung Siu-tsuen became at an early moment the prominent figure in the outbreak. He had failed in the literary examinations, and was therefore unlikely to rise in the service of the government. He had read some of the tracts printed by the missionaries, and appears to have considered himself the recipient of divine messages. His associates professed to acknowledge a "supreme being" and an "elder brother." Foreigners were disposed to believe that they inclined toward Christianity, and that its cause would be advanced by their success. By April, 1851, the Taiping forces were well organized, and numbered upward of 12,000 men. A little later Hung Siu-tsuen assumed the title *tien-wang* or heavenly prince. They accomplished various successes in the provinces of Kwangtung, Kwangsi, and Hunan, and on Dec. 23, 1852, they captured Han-yang on the Yangtse. In January, 1853, they took Woochang, the capital of the Hu provinces. In February Kiukiang and Nganking succumbed to their forces, and on March 8 they arrived before Nanking, which they captured on the 19th, murdering about 20,000 Manchus found in the city. In May a force was sent northward toward Peking. It consisted of only about 6,000 or 7,000 men, yet it marched over 400 m., subsisting on the country through which it passed. It was turned back when within 100 m. of the capital, and rejoined the forces at Nanking in the summer of 1854. For several years after the military operations

of the Taipings were little else than incursions to obtain contributions of money and provisions. The imperialists gradually closed in upon them, and at the end of 1859 their prospects were very gloomy. But in the spring of 1860 they attacked and routed the besieging army. The occupation of Chinkiang, Soochow, and the wealthy country lying between Shanghai and Ningpo, followed. The former city was threatened, but, being defended by foreigners, held out against the efforts of the insurgents. Ningpo fell into their hands. Had the Taipings displayed vigor and discretion, it is not impossible that they might yet have mastered the empire. But their government was one which built up not at all; it only ravaged the districts which it occupied, passing on to other districts when the first were exhausted. Unsatisfactory as had been the course of relations with the imperial government, foreign officials could not but feel that it represented law and order, and that its overthrow by the insurgents would be a disaster to native and foreign interests. Acting in accordance with this belief, the foreign governments determined to protect the ports open to trade. These became the bases of operations against the insurgents, in which the imperial armies were supplemented in some instances by detachments from the British and French forces, and by native troops drilled and commanded by foreign officers and armed with foreign weapons. Soochow and the other cities of the delta plain were reconquered in rapid succession, and in July, 1864, the Taiping capital succumbed. From thence a detachment of the insurgent troops found their way southward to the region where the rebellion had originated fourteen years before, and were dispersed.—Other important revolutionary movements were the Mohammedan rebellions in Yunnan and in the northwest, both of which originated in an attempt to extort from the government security against local oppressions. Notwithstanding a general massacre of the Mohammedans in Yunnan by the provincial authorities, the rebels gained strength, and in April, 1857, took Talifoo, the second city of the province, and in 1858 conquered the capital. Their leader, Tu-wen-si, assumed the title of Wen-soay (King or Sultan Suleiman), and succeeded in establishing his rule over an area of 65,000 sq. m. and a population of over 4,000,000. Only about a tenth of these were Mohammedans, who were called by the Chinese Kwei-tseu, but by themselves Pansi, which the English corrupted into Panthay. In 1866 the Chinese government agreed to recognize his independence, provided that he would make no further conquests, but he refused. In 1872 he sent his son Hassan to Europe to endeavor to establish friendly relations; but before any results were reached the Chinese took Talifoo and killed Suleiman. The conquest of the territory and the extinction of the empire of the Panthays followed.—The rebellion in the

northwest originated in 1862 at Singanfoo, capital of the province of Shensi, among the Mohammedan Dungenes, called by the Chinese Khoi-khoi or Khui-khui. It spread rapidly through the province of Kansuh and over the frontier of China proper into Dzungaria, and extended thence into E. Turkistan. Before the close of 1864 Khamil, Aksu, and Yarkand were taken, and soon after the Chinese evacuated the whole country. Dissensions broke out among the rebels, and an Uzbek chief, Yakub Kushbegi, gradually subjected the whole of E. Turkistan and part of Dzungaria, and established a government which still enjoyed independence at the end of 1873. In 1871 the Russians took possession of Kulja and the entire basin of the Ili. The territory thus lost by China embraces an area of about 600,000 sq. m., with 2,000,000 inhabitants.—The mission of Mr. Burlingame left Peking in the autumn of 1867. It had its origin in the desire of the government to demonstrate to western powers its friendliness, and to forestall demands of an extreme character which it anticipated would be made during the revision of the treaties of 1858 then about to take place. Its chief seized the opportunity to place before the world the indications of a marked change of policy on the part of the government, and to demonstrate that the old system of recourse to local authorities for the redress of grievances should be abandoned in favor of representation to the imperial authorities at Peking. The facts of his appointment to represent China, and of his being accredited to western states on terms of equality, afforded an indication of the marvellous change which had ensued since the war, and a more complete justification of the wisdom of the allies in insisting upon residence at the capital.—On June 24, 1870, a popular outbreak against foreigners occurred at Tientsin, resulting in a deplorable massacre. Its victims were the French consul, the vice consul, the interpreter of the French legation at Peking and his wife, a Catholic priest, nine sisters of charity, a French subject engaged in trade and his wife, and three Russians. The French consulate, the cathedral, and the missionary hospital in which the sisters were engaged, were destroyed. The most revolting barbarities were perpetrated before and after the deaths of the victims. The local officials cannot be held blameless for the massacre, but it has not been demonstrated that they intentionally promoted it, and the attempts made in some quarters to fasten responsibility for the event upon the government have been futile. The local officials were banished to a remote part of the empire, 15 of the rioters were executed, a large indemnity was paid for the destruction of property and for the families of those who had perished, and a special mission was sent to France to declare the regret of the government.

CHINA, Language and Literature of. I. THE COLLOQUIAL LANGUAGE. On the first access of Europeans to some knowledge of the lan-

guage of China, the most exaggerated notions were formed of its eccentricity and of the difficulty of its acquirement. A more intimate acquaintance, however, tended to dispel the illusion, and to show that much of the singularity that appeared to attach to it was really due to the fact that the written medium preserved the key to that agglutination or word-building, the traces of which in other languages disappeared before those who used them began to put their thoughts on record. It is true the language has very marked peculiarities, as the following observations will show; but these are merely a special phase of the universal development of human speech, arrested to some extent at an early stage by the use of a written character. The neglect of most writers on the language of China to distinguish clearly between the spoken and written forms, has resulted in the most confused notions entertained by those who are not familiar with the subject. That a close analogy exists between the oral and written media of communication cannot be denied; and yet it is equally true that their respective peculiarities are too distinctly marked to admit of the identification of one with the other. It is difficult indeed to believe that people ever spoke in the curt and sententious style of the books, and we have no evidence to prove a closer approximation of the two forms in any preceding age than we find at the present day. Be that as it may, it is easily demonstrable that in the oral medium as we now find it we have to do with a polysyllabic language. That a contrary view should ever have obtained, appears due to the confusion of ideas above referred to. It has been said, and not without a show of reason, that English is nearer a monosyllabic tongue than the Chinese. The fact that Chinese happens to be written in monosyllabic symbols does not really affect the question. English might be syllabically written with similar phonograms; and were these to a certain extent at the same time ideographic, the analogy would be perfect. The following sentence is taken at random from Thom's "Chinese Speaker:" "When a man goes forth to take a walk, his com-pan-ions may be pulling and hauling at him." Merely separating the syllables in this manner shows the whole theory of Chinese monosyllabism. Now look at the Chinese equivalent of this sentence: *Jin chũh-lai tsiow-taou, pãng-yew-mun lá-lá-cháy-cháy*. Here the groups connected by hyphens are as inseparable in sense as are those in the English version; and to dis sever one of the syllables of *pãng-yew-mun*, for instance, would do as much violence to the sense as a similar operation on the corresponding English term com-pan-ions. In the various dialects there are many polysyllabic words for which there are absolutely no characters. The number of syllables in the language is, as might be expected, variously estimated by different authorities. Morrison, basing his system on that of the native dictionary *Woò chay yün fò*,

gives 411 simple vocables; but taking into consideration the varieties produced by the aspirates, they amount to 533; and by the further distinctions of the tones, the number is swelled to nearly 1,600. Premare, in his *Notitia Lingue Sinicæ*, gives a list of 1,331 as the complete catalogue. Gützlaff estimates the whole number at 1,781. Mr. Wade, who has given uncommon attention to the subject for more than ten years, makes the whole number of simple and aspirated vocables in the Peking dialect 420, while by the application of tones the number is increased to 1,454. Probably the number of syllables in the Nanking and western Mandarin dialects may be somewhat in excess of this. The *Fun yün*, a native dictionary of the Canton dialect, gives the number of syllables when affected by the tones and aspirates as 1,582. Drs. Maclay and Baldwin, in their Foochow dictionary, which is based on the native work *Ts'eh lin pa yin ho ting*, a dictionary of the Foochow dialect, gives a list of 495 syllables that may be formed without aspirates or tones; but that is considerably more than the number in actual use. Even admitting that a perfectly accurate estimate could be made, it would doubtless be found that the numbers vary considerably for different parts of the empire. Mr. Edkins, who has given more attention to the sounds of the Chinese language than almost any one else, tells us that there has been a considerable secular transformation going on in the pronunciation from ancient to modern times; many relics of the older language being still preserved in the local dialects. The Mandarin or general dialect of China, which is that of the official class everywhere, is also the common language, with slight modifications, of several of the northern and western provinces. This is marked by the almost entire absence of consonantal terminations, *n*, *ng*, and *rh* being the only ones admitted. The provincial dialects of the south, however, have largely preserved the finals *k*, *m*, *p*, and *t*, and in one or other of them nearly all the letters of our alphabét may be found, either as initials or finals. It would be almost impossible to give even an approximation to the number of words in any of the dialects, made up with these syllables. In Stent's vocabulary of the Peking dialect, the most recent work of that class, the author says: "It does not contain all the combinations of characters, but a selection only of useful ones (amounting to upward of 20,000) sufficient for the use of beginners." It should be remarked, however, that while a large proportion of these are polysyllabic words, there are a great number of them also formed by combining two or more words.—No attempt having been made, even by foreign students, to reduce colloquial Chinese to an alphabetic system, the nearest approach has been to lay down two series of letters to represent the initials and finals, by which every syllable may be spelt. The following two lists, with one slight modification, are those adopted

by Medhurst in his Chinese dictionary, and are used throughout this article: 20 initials—*ch, ch', f, g, h, j, k, k', l, m, n, p, p', s, sh, t, t', ts, ts', y*; 55 finals—*a, ä, ae, an, än, ang, äng, au, ay, e, äa, äae, äang, äau, äay, äë, äen, ei, eih, en, èd, eu, èü, èuen, èüh, èun, èung, ew, ih, in, ing, o, ö, oo, ow, üë, üen, üh, un, ung, uih, uy, wa, wä, wae, wan, wän, wang, wäng, wei, wo, wö, wüh, wuy, ze*. One of the most important elements in Chinese orthoëpy, and one upon which it is admitted to be most difficult to make one's self understood by a stranger, is the tones. These are certain modulations of the voice, which, applied to a vocable, determine respectively the different meanings of the word so spoken. The tones of the language have a history which shows a gradual change from ancient times to the present. According to Edkins, there was a time when the Chinese did not differ from other languages in the matter of tones. In the time of the Chow dynasty (12th to 3d century B. C.) there were but three, the even, long, and short, or 1st, 2d, and 4th of the present series. During the Han period (206 B. C. to A. D. 237) another tone began to make its appearance, the receding, or 3d of the category. At some period not earlier than the 10th century, the first was divided into an upper and lower, thus forming a 5th tone; and so was completed the system we find in use now in the midland and western Mandarin-speaking regions. The 1st or even tone is the musical monotone, neither admitting of inflection in the tone nor variation in the volume of voice. The 2d or long tone is that rising inflection which is heard in our own language, in every question that indicates some degree of surprise, and in the common expressions *ah! indeed!* The 3d or receding tone is a monotone like the even, with this difference, that it is an inverted swell, and dies away upon the ear like the tones of receding music. The 4th or short tone may be regarded as an abrupt monotone, like the *a* in the English word *rat*, omitting the final consonant. In Canton all the four tones are divided into upper and lower, forming eight in all. In the Shanghai dialect there are also eight. In Foochow there are theoretically eight tones, but practically only seven. In the neighborhood of Amoy there are seven; and in the Hakka dialect in Canton province there are only six. The most recent change among the tones is the abandonment of the short in the Peking dialect, where the words of that class are distributed among the other three classes, leaving only four tones now in that region. Gützlaff thus divides the syllables of the language among the four tones: 1st tone, 533; 2d, 501; 3d, 519; 4th, 221. Besides the aspirates and tones, accent is also to be taken into account, as modifying the utterance of a word; particular members of a sentence, according to the dialect, being subject to this modification.—Chinese possesses a grammar, in which all the parts of speech are nearly as well defined as in that of any other

language; but depending as it does so much on the value of position among the members of a sentence, it is less flexible than that of inflected tongues. Polysyllabic nouns are formed in various ways, among which are the following: 1. The combination of a root noun with a final particle, as *yin-tszè*, silver, where *yin* is the root and *tszè* the particle; *jih t'ow*, sun, where *jih* is the root and *t'ow* the particle. 2. Combination of a root noun with a personal suffix, as *choò jín*, master, composed of *choò*, master, and *jín*, man; *näng-foo*, agriculturist, from *näng*, farmer, and *foo*, person; *t'óo-hoó*, butcher, from *t'óo*, butcher, and *hoó*, resident; *müh-tséang*, carpenter, from *müh*, wood, and *tséang*, mechanic; *shwuy-shòu*, water-carrier, from *shwuy*, water, and *shòu*, hand. 3. Combination of a specific noun with a generic, as *pih-shoó*, the cypress, from *pih*, cypress, and *shoó*, tree; *lè-yü*, the carp, from *lè*, carp, and *yü*, fish; *tá-lè-shih*, marble, from *tá-lè*, the name of a place, and *shih*, stone. 4. Combination of a number with a root noun, giving a special meaning, as *sze-páu*, writing materials, from *sze*, four, and *páu*, precious objects (*i. e.*, ink, pallet, pencil, and paper); *pih-sing*, the people, from *pih*, a hundred, and *sing*, surnames. 5. Combination of two substantives of allied meaning, as *fung-süh*, custom; *é-sze*, meaning. 6. Combination of two antithetic roots, as *tung-se*, thing, from *tung*, east, and *se*, west; *tá-seáu*, size, from *tá*, great, and *seáu*, little. 7. Combination of two roots in construction, as *swán-fü*, arithmetic, from *swán*, calculation, and *fü*, laws of; *shoo-fäng*, library, from *shoo*, books, and *fäng*, room. 8. Combination of an adjective and a substantive, as *laü-shoó*, rat, from *laü*, old, and *shoó*, the genus *mus*; *léang-sin*, the conscience, from *léang*, good, and *sin*, heart. 9. Combinations of three, four, and more syllables are not uncommon, as *maé-maé-jín*, a trader, from *maé*, buying, *maé*, selling, and *jín*, man; *waé-kwó-jín*, foreigner, from *waé*, foreign, *kwó*, country, and *jín*, man. Adjectives are chiefly distinguished by the addition of the syllable *teih* to a qualifying root, as *haü-teih*, good; *pih-teih*, white. Sometimes they are formed by the combination of two roots of allied meaning, as *lan-tó*, lazy, from *lan*, idle, and *tó*, indolent. Ordinal numbers are formed by prefixing *té* to the cardinal, as *san*, three, *té-san*, third. The personal pronouns are *wo*, I; *nè*, thou; *t'a*, he or she. The plural is formed by the addition of the syllable *mún*, as *wo-mún*, we. Verbs are formed by the combination of two or more syllables: 1. By a root and an auxiliary, as *nà-laé*, to bring, from *nà*, to take, and *laé*, come; *ké-tih*, to remember, from *ké*, to remember, and *tih*, obtain. 2. By two verb roots, as *hè-hwan*, to rejoice, from *hè*, to be pleased, and *hwan*, to be delighted. 3. By a verb and a noun root, as *shwó-hwá*, to talk, from *shwó*, to say, and *hwá*, words. Adverbs are formed in various ways, by the combination of two or more syllables, as *lè-mèen*, inside, *i. e.*, inner face; *waé-t'ow*,

outside, *i. e.*, outside head; *ch'a-pǔh-to*, nearly, *i. e.*, differ not much; *tsung-tseén*, formerly, *i. e.*, from before; *mán-mán-teih*, slowly; *ch'áng-ch'áng-teih*, constantly; *píng-píng-gan-gan*, comfortably; *yíh-tse*, altogether, *i. e.*, one arrangement; *yíh-ting*, certainly, *i. e.*, one fixed. Prepositions are sometimes monosyllabic, sometimes dissyllabic, as *t'ung*, with; *ch'óo-leáu*, besides. Postpositions are of very frequent occurrence, as *sháng*, above; *hěá*, below; *tséén*, before. Most of the conjunctions of other languages are found in Chinese. They are either disjunctive, as *huó-shé*, or; or adversative, as *jén-úrñ*, however; or causative, as *ké-jén*, since; or conditional, as *jō-shé*, if. Interjections are very numerous in Chinese. To express aversion, they say *pá-leáu-pá-leáu*; for sorrow, *k'ò-seih-leáu*; for commiseration, *k'ò-téén*; for surprise, *ae-yá*, &c. In composition the adjective precedes the substantive, and the genitive precedes the nominative. The antecedent precedes the consequent; the verb is preceded by the subject and followed by the complement. The gender of persons is generally expressed by *nán*, male, and *neù*, female, followed by the syllable *jín*, person. For the lower animals *tsze* is used for the female and *heung* for the male. Sometimes also *kung* is used for the male and *moò* for the female. For persons, grammatical number is generally expressed by the plural affix, *mún*, but it is frequently indicated by some expression in the phrase. Such terms as *chung*, a multitude, *too*, all, *keae*, altogether, *tsueén*, the whole, and *to*, many, indicate the plural number, rendering any affix to the noun unnecessary. The genitive case is generally expressed by the affix *teih*; for the dative, *keih* is prefixed; the instrumental takes the prefix *pe*; for the ablative *tsung* is prefixed; for the vocative *o* is affixed; for the locative, *tsai* is prefixed. There are many other syllables used with the same powers. The moods and tenses of verbs are generally understood by the context. Sometimes for the present indicative *joó-kin*, now, may be introduced between the pronoun and the verb. An indication of former time, as *ná-shé*, at that time, will express the imperfect. The perfect may be expressed by the postfix *kó*, or *leáu*, or *wán-leáu*; the negative is formed by placing *múh-yéu* before the verb. The pluperfect is formed by putting *è-king* before the verb and *kó* after it. A future is made by placing *tséang-laé* before the verb; *yaou* is also used. The second person of the imperative mood is made by affixing *pá* to the verb; the third person may be made by placing *yaou-ting* between the pronoun and verb. The optative is formed by preposing *pa-púh-tíh* or *hán-púh-tíh*. A negative imperative is made by placing *pěé* before the verb. A salient feature in the language is the use of a class of words that are interposed between a number and the substantive with which it is connected, in the same manner as we use the word head in speaking of so many "head of cattle;" but

whereas this phraseology is rare and exceptional in English, it is on the contrary of almost universal occurrence in Chinese. It is difficult to render such terms literally into English; but, to take an example for the sake of illustration, a Chinese, instead of saying *yíh-taou*, a knife, or one knife, would say *yíh-pá-taou*, one handle knife, *pá* being used for most instruments held by a handle. Again, *san-t'eaou shay*, three serpents, *t'eaou* being generally applied to objects where length is the characteristic. *Chang* is applied to objects of the sheet kind, as paper, mats, &c.; *kéen* is applied to houses, *lèang* to carriages, *weí* to persons, and *kó*, which is of most general application, is used with human beings and inanimate objects indefinitely. There are 20 or 30 such words in extensive use, and a much larger number of restricted application. By European writers they have been variously named, classifiers, numerals, distinctive numeral particles, numeratives, auxiliary substantives, &c. II. THE BOOK LANGUAGE. A knowledge of colloquial Chinese is doubtless an important step toward understanding the written language, as theoretically and in the great leading features they are identical. Yet it is found that, even to a person well versed in one or more of the dialects, it is still necessary to make a special study before he can see his way through the native literature. Not only must he gain a familiarity with a considerable number of the characters, but the grammatical details have so much that is peculiar, that the application required is little if any less than what has been already spent in acquiring the spoken dialect. The more remarkable characteristics are conciseness of diction, the substitution of monosyllables for polysyllables, the employment of special particles, the absence of classifiers, and the more or less extensive use of stereotyped phraseology, consecrated by the usage of antiquity, and in many cases covering some recondite allusion, the resulting idea being such as nothing but the traditional explanation could unfold. The *Shwò-wán* dictionary, which was completed early in the 2d century of our era, contains 9,353 different characters and 1,163 variants. This number has gone on increasing from age to age since that time, so that a recent edition of that work gives the number of characters in the language as 52,325; and even that number might be considerably increased were all the technical characters and variants included. Buddhism alone, we are told, has added 26,430, but most of these are confined to the works of that religion. The imperial dictionary of Kang-he, the most recent work of the class, gives 43,496; but when the obsolete forms and those to which no sound or meaning is attached are subtracted, the number remaining and in actual use is reduced to 32,873. It is not to be supposed, however, that the profoundest scholar is master of anything like this number; 10,000 or 12,000 would probably

suffice to make an accomplished graduate. An official historiographer under the Han dynasty was required to know 9,000 characters. In the "Canonical Four Books" there are altogether about 2,400, and with the five classics inclusive the number only amounts to about 4,600. With a ready command of 2,000 or 3,000 a person may assume a very respectable status in the literary scale. Gützlaff gives a computation of 24,235 as the number now in use.—Had we no historical data to guide us, an inspection of the structure of this vast mass of characters would naturally lead to the conclusion that they were not the result of a simultaneous effort; and it becomes a question of some interest to know by what incipient stages the system began to shape itself, and on what principle the gradual accretions have been going on from age to age. In reply to such questionings many of the natives have occupied themselves in the most profound researches regarding the characters; and according to the generally received theory, the whole system may be classed in six categories, *i. e.*, the *lüh shoo*, or six classes of characters. The first of these is called *l'ëang-hing*, or hieroglyphs. These were termed *wán*, or figures, being the simplest forms, and were intended to represent visible objects, as ☉ *jih*, the sun; 👁 *müh*, eye; 🗨 *k'ow*, mouth. The earliest efforts of this kind are probably all lost sight of for many ages past; but the most ancient examples that have come down to us, in the grotesque figures on the bronzes of the Shang and Chow dynasties, give some faint resemblance to the objects they are intended to represent. The second class is termed *chè-szé*, or indicatives, and these show the first tendency toward the expression of abstract ideas, pointing to some property or condition; as 上 *sháng*, above; 下 *hà*, below; 三 *san*, three. In the third class, *hwáy-é*, or composites, the first attempt appears to represent figurative ideas, by the combination of two or more hieroglyphs; as 明 *míng*, bright, formed by the combination of sun and moon. These were termed *tszé*, or derivatives, in contradistinction to the simpler *wán*, or figures. In the fourth class, called *heae-shing*, or phonetics, we have a still further development of the graphic art, and the first approach toward an alphabetic symbolism. In this division one part of the character is hieroglyphic or ideographic, and the other merely represents the final sound, as in 江 *k'ang* and 河 *hó*, both signifying river. The same hieroglyph, 水 *shui*, or water, is the generic idea in both, and gives no clue to the sound; while in the first the accessory 工 *kung*, work, and in the second 可 *k'ó*, can, are simply phonetic elements, and add nothing to the meaning. The very inadequate resources of the three previous classes to supply the necessities of a moderately developed literature, may be seen in the fact that this class is

reputed to contain no fewer than 21,800. These four classes indeed include the whole of the written characters, and the two remaining divisions are merely special applications of already existing forms. The fifth class, called *chuen-choó*, or defectives, includes characters which have come to be used for others of the same sound, as 說, used for 悅 *yüè*, pleased. The sixth class, called *k'è-t'séy*, or substitutes, contains those characters which, besides the primary and obvious meaning, have acquired a secondary and metaphorical sense, as 長 *ch'ang*, long and a superior; 經 *king*, warp of a texture and classic. These classes, the tradition of which dates back to a considerable antiquity, are not always arranged in this order, which is adopted, with the explanations, from Twan Yü-h-tsaè, one of the most erudite scholars of the present dynasty. Some authors, however, only make the first three classes to affect the forms of the characters, and the other three the sounds. Others again consider all the six classes as referring to the forms.—Apart from the elementary composition of the characters, there has been a great diversity in the modes of writing the same, from ancient to modern times. Some native authors enumerate as many as 36 different styles of writing; and the *Yü-ché-shing king foó*, an ode by the emperor K'een-lung, in praise of his ancestral city Mookden, is printed in 32 different forms of Chinese seal characters, and as many of the Mantchoo; but the greater part of these are fanciful or imaginary. Some seven or eight will include nearly all the styles that have been in general use. The invention of the earliest known, termed *koò-wán*, or ancient figures, is attributed to a sage named Tsang-hee; and under this term are included the semi-pictorial forms found on the ancient bells and vases. In the 8th or 9th century B. C. this was replaced by a different style, invented by one Chow-she, termed the *tá-chuen*, or greater seal character; and this in its turn gave way to the *seáu-chuen*, or lesser seal character, accredited to Le-sze, the minister of the famous Che-hwang of the Tsin dynasty (227 B. C.). In these two latter styles much of the pictorial had disappeared. The *Shwó-wán* is a dictionary of the lesser seal character. With the spread of literature, however, and the gradual adoption of silk for writing on in place of bamboo tablets, the seal characters with their curved lines were found to be too cumbersome. About the end of the same dynasty (206 B. C.), the *le-shoo* or official character was invented by Ching Mo. As the name implies, this was probably used in governmental documents; it is still sometimes employed for prefaces to books. The *hing-shoo* or running-hand is an elegant form of manuscript, especially suited to the hair pencil, which was already in general use at the time of its introduction during the Eastern Han dynasty (A. D. 56-220). The invention is as-

cribed to Lew Tih-shing. The *ts'au-shoo* or cursive character is an extremely abbreviated hand, much used in rough draughts and daily transactions. It was introduced about the same date as the preceding, by a scholar named Chang Pih-ying. The *k'ae-shoo* or typographic character is the square form generally used in books and printed documents, which was introduced about the 11th century. The three latter kinds are in general use at the present day. Great pains are taken by the Chinese to secure the correct and graceful form of their characters, and the most minute rules are laid down for their formation, both as to the order of sequence and proportions, which are carefully enforced by the teachers. All the characters in the language are reckoned to be made up of the eight elementary

parts contained in the character 永 *yung*, signifying eternal, *i. e.*, a dot, horizontal line, perpendicular line, hook, spike, sweep, stroke, and dash. There is a small native work containing 92 short rules for writing, illustrated by examples. These examples, with a partial translation, have been published by Davis, in the "Transactions of the Royal Asiatic Society," vol. i., under the title *Eugraphia Sinensis*. —Dictionaries of the characters are numerous, and, as may be supposed, it was necessary to adopt some artifice in the arrangement of these, in order that by a fixed method any character might be easily discovered in the mass. To effect this, a certain number of distinguishing characters were at an early age selected, to which all the others might be respectively referred. These are termed *poó* by the Chinese, which has been variously translated elements, keys, and radicals. The latter is probably the most convenient term. The number of these radicals has varied in different ages. The *Shwó-wán* has 540; the *Yühpên*, completed in 523, has 542; the *Lüypên*, by Sze-ma Kwang, has 544; in the *Lüshoo pün é*, which appeared early in the Ming dynasty, the number of radicals is reduced to 360; in the *Ching yün wuy pên*, published about the beginning of the 17th century, there are 239, and a supplementary class of characters at the end, not referable to any radicals; the *Tszé wuy*, which was published at a later period of the same dynasty, contains only 214; and the two principal dictionaries that have been published during the present dynasty, *Ching tszé tung* and *K'ang hé tszé t'ên* (which latter forms the basis of Medhurst's "Chinese and English Dictionary"), have both adopted the number fixed by the *Tszé wuy*. These are divided into 17 classes, according to the number of their strokes. In the 1st class are 6 radicals, each composed of a single stroke; the 2d class has 23 radicals of 2 strokes each; the 3d class has 31 of 3 strokes; 4th class, 35; 5th, 22; 6th, 29; 7th, 20; 8th, 9; 9th, 11; 10th, 8; 11th, 6; 12th, 4; 13th, 4; 14th, 2; 15th, 1; 16th, 2; 17th, 1. These for the

greater part represent elementary hieroglyphs, and are probably as judicious a selection as could have been made. Gonçalves has reduced the number of the radicals to 127 in his *Diccionario China-Portuguez*, but it is doubtful if his system will ever extend beyond the work in which it first appeared. Most of the radicals represent generic ideas, and have been classed by Kidd under the following 10 categories: 1st, celestial objects, as sun and moon; 2d, atmospheric phenomena, as wind and rain; 3d, human properties and relations, as head and father; 4th inferior animals, as tiger, bird, and fish; 5th, elements of nature, as fire and water; 6th, terrestrial productions, as wheat and rice; 7th, abstract qualities, as black and bitter; 8th, weapons and utensils, as lance and dish; 9th, verbs, as to walk and to follow; 10th, miscellaneous terms, as error and garments. Under one or other of these heads every character in the language is to be found, and in very many instances the radical gives the generic idea of the special character sought. The radicals do not hold any uniform position in the characters. Some are placed on the right side, some on the left, some at the top, some at the bottom, some in the middle, some on both sides, some surrounding the supplementary part, some embracing the top and right side, some the top and left side, some the left side and bottom, some at one of the corners, and a number of others promiscuously placed; all which must be learned from practice. Many of them are very much abbreviated and altered in form when used in composition, so as scarcely to bear any resemblance to the isolated figures. Under each radical in the dictionary, the related characters are arranged *seriatim*, according to the number of additional strokes; so that having discovered the radical and counted the number of extra strokes, it is in most cases a very simple process to pick out the character in question. There is a great difference in the number of characters attached to the various radicals. According to the *Tszé wuy*, which contains about 30,000 characters, the 140th radical, *ts'au*, herb, has 1,423 under it; the 85th, *shwü*, water, has 1,330; the 75th, *mü*, tree, has 1,230; the 64th, *shou*, hand, has 1,012; the 30th, *k'ow*, mouth, the 61st, *sin*, heart, the 38th, *neü*, woman, all have large numbers connected with them; and so on through the whole list, the numbers gradually decreasing till we come to the 138th, *kän*, a limit, which has only 5 characters under it. The character having the greatest number of strokes is 𩇛 *ping*, the sound of thunder, the last under the 173d radical, 雨 *yü*, rain, being a quadruplicate form of 雷 *lay*, thunder. In some works of a higher class, pedantic authors are in the habit of using strange and obsolete forms, in place of the ordinary characters. In novels and books of light reading many of the characters are so much abbreviated that a special

practice is necessary to enable one to read them off with ease. In epistolary correspondence and other writings by the partially educated, it is a very common practice to replace the proper character by another of the same sound without regard to the meaning, thus moving unconsciously a step in advance toward phonetic writing. As it is a point of etiquette to refrain from mentioning the private name of an emperor, it has become customary to avoid writing the characters; and when one occurs, it is replaced by another of the same meaning. Thus the *T'ung-t'een*, a work of the Tang, speaking of the famous Buddhist traveler Fa-h'een, changes the last character *h'een*, meaning brightness, for the synonymous character *m'ing*, because *h'een* happened to be part of the private name of the emperor Chung-tung. Sometimes the character is abridged by one or more strokes, as in the name of the Kin dynasty Tartars, who were formerly named Neu-chin; but the private name of the emperor Hing-tung of the Leaou dynasty containing the character 眞 *ch'in*, the Chinese historians of the period omitted the two lower strokes, thus forming the character 直 *ch'ih*, and they have retained the name of Neu-chih ever since. Sometimes the character is mutilated without changing the sound, as in the case of 寧 *Ning*, part of the private name of the emperor Taou-kwang, which is now commonly written 寧 *ning*, with the same sound and meaning. In more formal documents it is replaced by 甯, a homophonous synonyme. A curious illustration of the same practice is found in the *K'ang-he* dictionary. The character 玄 *heuen*, which formed part of the name of the reigning monarch, having been the 96th radical in the *Tszé wuy* and *Ch'ing tszé t'ung* dictionaries, was promoted to the 95th place in the new dictionary, being the first in the five-stroke class. In common use, as in the name of the idol Heuen-te, it is often replaced by 元 *yuén*. The private name of Confucius was 丘 *K'ew*, which in reading the Chinese avoid pronouncing, by saying *mov* ("such a character") instead. In like manner it is considered a mark of filial piety to refrain from writing the name of a parent; and some invariably omit one or two strokes when such characters occur.—The Chinese write in vertical columns, following from right to left, and it is customary in the better class of works to raise the name of the dynasty a character above the other columns; even should it occur anywhere in the middle of a column, that column is abruptly broken off, and the imperial character carried up to commence another, while the sense of the passage is continuous, as if there were no break. The title or functions of the emperor are raised two characters above the other columns, and the titles of the imperial ancestors are raised three characters. In inscriptions and docu-

ments, the mention of an emperor is frequently preceded by a blank of two characters' length, as may be seen in the famous Nestorian inscription at Se-gan. The Taiping rebels, in their proclamations, were accustomed to elevate the title of the heir apparent one character, the designation of Jesus Christ, and also the chief Hung Sew-tseuen, two characters, and that of God the Father three characters above the other columns.—The prevalence of monosyllables in the written language has been referred to. Thus, for the word silver, instead of *yin-tszé* of the colloquial, *yin* alone is used; for sun, instead of *j'ih-tow*, the syllable *j'ih* is used; instead of *choo-jin* for master, *choo* is used. For the verb *ké-t'ih*, to remember, *ke* is employed; and *huan*, to rejoice, takes the place of *he-huan* of the colloquial. Another peculiarity of the written language is the capability of some of the characters assuming the rôle of different parts of speech, according to the positions they occupy in a sentence. Thus the same character represents the verb *sh'ih*, to eat, and the noun *sze*, food; another represents *yó*, music, and *l'ó*, to delight in; *e* in the first tone signifies garments, while the same character pronounced in the third tone means to dress. In classical books we find a character undergoing an analogous change of meaning even without any alteration in the pronunciation; as *laou*, meaning old and to treat one as due to age; also *yeu*, young and to treat one as due to youth. This peculiarity extends to other parts of speech also, as *e*, strange and to be astonished.—All the cases of nouns may be indicated by position, and the oblique cases also by certain particles. The genitive is preceded by *che*. The dative is preceded by *yu* or *hoo* following a verb. The accusative is preceded by *e*, *yu*, or *hoo*. The vocative is followed by *hoo*. The ablative is preceded by *yu*, *hoo*, *tsze*, or *tsung*. The locative is preceded by *yu*, or followed by *chung*, *nuy*, *k'een*, *che-chung*, *che-nuy*, or *che-k'een*. The instrumental is preceded by *e*. Moods and tenses of verbs are generally indicated by the general construction of a sentence, though particles also are sometimes used. Past time is indicated by the prepositions *ts'ang*, *chang*, *ke*, *king*, and *e*. Occasionally *ts'ang* is employed to mark the future. Pronouns are sparingly used, unless the sense or the rhythm actually requires them. The first person is often replaced by a term of humiliation, as *yu*, the stupid one; while a term of exaltation is used to replace the second person. When the pronoun *yu*, I, has to be written or printed, it is often put in smaller type than the other characters, as a mark of humility; just the reverse of our English practice.

III. LITERATURE. It has been said that the Chinese have the most extensive literature of any nation in the world; and it is certain that in no other are the records so continuous and complete for a period ranging over 2,000 years. The very earliest fragments that have any claim to genuineness do not extend higher than the

first thousand years B. C., and it is not till the latter part of that period that we meet with any noticeable list of authors. The works of Confucius then come before us; also several of the great writers of the school of Tao, some famous moralists and writers on the military art. The mechanical appliances in aid of literature at that time, however, must have been sorely discouraging to authorship. Even several centuries subsequent to Confucius slips of bamboo were still used, on which the characters were scratched or engraved. These were gradually superseded by the silk texture, and in the beginning of the 2d century of our era paper was invented, the pencil having already been brought to a considerable degree of perfection. More than two centuries before Christ, history speaks of an effort made by the first monarch of the Tsin dynasty to destroy the great body of the existing literature, his decree exempting only writings on medicine, divination, husbandry, and the annals of his own house. The decree was supposed to be executed, and entailed at the same time the death of a great number of scholars. In 190 B. C. the law for the suppression of literary works was repealed by the emperor of the Han then reigning, and a stimulus was given to learning. The historian of the Western Han, which came to an end in A. D. 24, gives a catalogue of works in the imperial library, comprising classics, philosophy, poetry, military tactics, mathematics, and medicine, consisting of 11,292 sections, by more than 500 authors. Works were then written on scrolls, and continued to be so down to the 10th or 11th century, when printing came into general use, and the huge piles of manuscript rolls gradually dwindled down to the dimensions of a few antiquarian curiosities. It has frequently been asserted that there is nothing in Chinese books to repay the trouble of learning to decipher them; and in view of the protracted study necessary to acquire a competent familiarity with the subject, there is a certain amount of truth in the statement. It should, however, be noted that the books of the Chinese have not had fair play at the hands of Europeans; and too frequently it happens that, either from want of the requisite attainments on the part of the translator, or from a desire to hold up to ridicule a subject uncongenial to his taste, translations and quotations have been little better than caricatures. At the same time, it must be admitted that some translations have been very favorably received by western scholars, and give the earnest of much that may yet be discovered in this unexplored mine.—In taking a rapid review of the literary productions of the empire, it will be convenient mainly to follow the order and classification generally adopted by native writers, and to commence with what are termed the *King*, or "Classics," which are supposed to have been written by or to have passed under the revising hand of Confucius. These are held in the

highest reverence, and looked upon as the standard from which there is no appeal. They are five in number, and four of them at least, there is good reason to believe, passed through the hands of the sage in one form or another. One, the history of his native state, is said to be his own composition; but another, the "Book of Rites," appears in such a fragmentary state, that it is thought by critics to be a compilation by some scholar during the Han dynasty. The earliest of these, the *Yih-king*, is a veritable mystery. The nucleus of the work is a series of figures composed of whole and bisected lines. These were at first eight in number, and attributed to the legendary sage Füh-he, each consisting of three lines. Ranged in octagon form, these eight trigrams are very extensively used as decorative objects, on dishes, vases, bells, utensils, the lintels of doors, the gables of houses, the ceilings of rooms, and a numberless variety of other positions, being rated to comprise a vast amount of hidden wisdom. Their names are *k'een*, heaven; *t'uy*, vapor; *lê*, fire; *chîn*, thunder; *sun*, wind; *k'an*, water; *k'ân*, mountain; *kwân*, earth. These are variously looked upon, as the heads of categories, the rudiments of written language, or symbols of philosophic systems. By squaring the number, 64 were produced, each formed of two of the original trigrams, superposed one on the other, and each one having a separate name. These hexagrams, which are assigned to a later hand, form the themes of so many separate sections in this famous book. Wän-wang, the founder of the Chow dynasty, while in prison for a state offence, employed his time in studying these symbols, and appended a short text to each, under the name of *T'wan*. These are followed by remarks in detail on the several strokes of each hexagram, which are called *s'ang* (figure), and are said to have been added by Chow-kung, the son of Wän-wang. The additional portion of the work tradition ascribes to Confucius, being a kind of commentary, reflections, and apparently irrelevant remarks on the texts of Wän-wang and Chow-kung. Although more than 500 commentaries and treatises have been written to elucidate this strange book, it is scarcely saying too much to assert that none of them have succeeded in bringing an intelligible meaning out of it. If there be any meaning at all, it is probably a work on divination or some occult art. There is a Latin translation of the *Yih-king* by Père Regis and other Jesuit missionaries (edited by Julius Mohl, 2 vols., Stuttgart and Tübingen, 1834). The second classic, named the *Shoo-king*, contains a sketch of the ancient history of China, from the 24th century B. C. down to the emperor Ping-wang of the Chow dynasty, 721 B. C. It appears to have been compiled by Confucius, from the historical remains of the Yu, Hea, Shang, and Chow dynasties; but in the vicissitudes of the earlier ages it has evidently suffered much in its integrity. Tradition asserts that it con-

sisted of 100 chapters as it left the hand of Confucius, but nearly all the existing copies having been consigned to the flames by Che Hwang-te, the book burner, the now existing copies are the outcome of the mutilated fragments and half-suspected versions bequeathed to posterity by the first three or four centuries of the Christian era. Even in its imperfect state, however, it is a most interesting document, and apart from its historical character, and description of the great flood, it supplies more than hints regarding the principles of government, astronomy, music, agriculture, and other subjects of great importance to our knowledge of those ancient times. About 150 treatises, exegetical and illustrative, have been written about the *Shoo-king* as a whole or in particular portions. It has been translated into French by Gaubil (edited by De Guignes, Paris, 1770; also in Pauthier's *Livres sacrés de l'Orient*, 1841), and into English by W. H. Medhurst (Shanghai, 1846) and James Legge, D. D. (vol. iii. of "The Chinese Classics," Hong Kong, 1865). The third member of this pentateuch, the *She-king*, consists chiefly of a collection of ballads used by the people of the various petty states of China in ancient times, selected and arranged by Confucius, to the number of 311, of six of which, however, nothing but the name remains. The book is divided into four parts: 1, odes of the various states; 2, minor odes of the kingdom; 3, higher odes of the kingdom; 4, temple hymns. From these stanzas we get more insight into the life and manners of the people in the early ages than from any other work extant. They are simple in composition, frequently descriptive of rural and domestic life; many are martial odes, with covert political allusions, and hints at the prevailing state of society. Upon this also about 150 illustrative works have been written. It has been translated into Latin by Père Lacharme (edited by Mohl, Stuttgart and Tübingen, 1830), and into English by Dr. Legge (vol. iv. of "The Chinese Classics," Hong Kong, 1871). The evidence for the *Le-ke*, or "Book of Rites," seems less satisfactory than that for the others. Subsequent to the book burning merely scattered fragments of the original work were to be found, till Tae Tih, a scholar of the 1st century B. C., made a collection of miscellaneous pieces, to the number of 214 sections, only a small proportion of which, however, are believed to have belonged to the work of Confucius. He reduced the collection to 85 sections, which has since been known as the *Ta tai le*. This was revised by his nephew Tae Shing, who reduced the whole to 49 sections, in which form it has been called the *Seaou tai le*, and has been transmitted from age to age as the *Le-ke*, and by imperial authority ranks as one of the five classics, though secondary in grade. It is the most bulky of the whole, and is replete with lessons and rules for daily conduct, public and private, bearing throughout the theory that

true etiquette is but the manifestation of rectitude of heart. More than 70 works are to be found illustrative of this book. There is a French translation by Gallery (Turin, 1853). The *Ch'un-ts'ew*, the last of the five, is the only one actually written by Confucius, being the history of Loo, his native state, from 722 to 484 B. C. As an incipient effort in the art of history making, it appears to have called forth much admiration and eulogium in early times; but, consisting as it does of a very bald detail of state occurrences, it can scarcely maintain a high position in the judgment of unbiassed critics. There are about 250 works illustrative of this text. (English, "The *Ch'un-ts'ew*, with the *Tso chuen*," vol. v. of "The Chinese Classics, by Legge.") Besides the special commentaries on the separate classics before referred to, there are about 80 exegetical works treating of all the five. In 1270 a work was published, called *Choo tsze yu luy*, in 140 books, consisting of the discourses of Choo He, as recorded by several of his disciples. From this Ching Chuen extracted and arranged the philosopher's elucidation of the five classics, which he published in 1725, under the title *Choo tsze woo king yu luy*, in 80 books. The name of Choo naturally gives much weight to this compilation. A sixth classic, under the title *Yö-king*, or "Book of Music," is spoken of in ancient times as also the work of Confucius; but it is now lost, and the only vestiges on the subject extant are a section in the *Chow-le* and another in the *Le-ke*.—During the T'ang dynasty a compilation was made under the name of the *Shih san king*, or "Thirteen Classics." In this collection three of the commentaries on the *Ch'un-ts'ew* were also admitted to the rank of secondary classics. Of these, the most important and best known is the *Tso-chuen*, by a scholar named Tso, supposed to have been a disciple of the sage. This is a narrative of events contemporaneous with the *Ch'un-ts'ew*, but so fully developed, and so much superior to the latter, that it has been said, "In no ancient history of any country have we such a vivid picture of any lengthened period of its annals, as we have from Tso of the 270 years he has embraced in this work." The other two commentaries, named after their respective authors *Kung-yang chuen* and *Küh leang chuen*, are much less known and read than that of Tso. The substance of both was handed down orally for centuries, but that of Kung-yang was put into writing about the beginning of the Han dynasty, and the *Küh leang chuen* more than a century later. They consist chiefly of scholia and expositions of the text of the classic. A number of works have been written in elucidation of these three commentaries. Besides the "Book of Rites" above noticed, there are two other works of the same order, reckoned among the secondary classics. The *Chow-le*, or "Ritual of the Chow Dynasty," claims a very high antiquity, and has been at various times repudiated, and again accepted

as genuine. The evidence now seems to be in its favor. It contains a full account of the government organization during the Chow dynasty, giving a catalogue of the officers with the functions of each. It is divided into six sections, entitled respectively by the names of heaven, earth, and the four seasons, the last of which, the winter section, was never recovered after the burning of the books, and has been supplied by another ancient document, called the *K'au kung ke*, or "Artificer's Record." In the *Chow-le* is found the type of the present six administrative boards at Peking. About 60 works have been written in reference to this book. (French by Biot, Paris, 1851; English by Gingell, "The Ceremonial Usages of the Chinese, B. C. 1121," London, 1852.) The *E-le* appears also to be of very remote origin. The subject matter consists of rites of a more private and domestic character. The book is now little studied or read, although there are about 40 works on record treating it in detail. The *Sze-shoo*, or "Four Books" *par excellence*, having long held their place as secondary classics, are now far better known and incomparably more read than any of those above mentioned, being the class books of the schools all over the empire. Foreigners frequently designate them the "Canonical Four Books." The first of these, named the *Ta-hëo*, originally formed part of the *Le-ke*, but was separated from it by Choo He, who arranged the collection as it now stands. It consists of 11 chapters, the first of which is called the classic text, being the words of Confucius on the fundamental principles of ruling a kingdom, which he traces to the source of personal self-government. The remaining 10 chapters are by his disciple Tsang Ts'an, amplifying by quotations from history the sententious text of the sage. Several versions of the *Ta-hëo* have been published, generally in collections: in Latin, by Ignatius a Costa (with the Chinese text, Keen-chang-foo, 1662; without, Paris, 1687); in English, by Morrison (London, 1812), by Marshman (with the Chinese and a praxis, Serampore, 1814), and by Legge (in "The Life and Teachings of Confucius," London, 1869); and in French, by Pauthier (Paris, 1837). The *Chung-yung* is the work of Tsze-sze, the grandson of the sage, and is the most profoundly philosophic of the four. It treats of the moving principles of human action, and illustrates the practice of virtue by an ideal perfect man. When all the passions and affections are held in perfect equilibrium, the heart is said to be correct. Besides other editions and translations, the *Chung-yung* has been published by Rémusat in Chinese and Mantehoo, with Latin and French versions (Paris, 1817); and in English by Legge (London, 1869). The *Lun-yu* consists of a collection of pithy sayings and detached dialogues between Confucius and his disciples and others; apparently reminiscences of the sage and his teachings. There is much

in the doctrines laid down calculated to fortify men in the practice of virtue, and we even find the golden rule of Christ expressed by Confucius more than once, though in a negative form. There are some things in it, however, sanctioned by this great teacher, to which a Christian cannot assent. There is a Latin translation in *Confucius Sinarum Philosophus* (Paris, 1687); German, in Schott's collection (Halle, 1826); English, by Marshman (first half, Serampore, 1809), and by Legge (London, 1869). The fourth of the "Four Books" is known by the title of *Mäng-tszé*, that being the name of the author, which in European works is Latinized into Mencius. He is said to have been a pupil of a disciple of Tsze-sze, the author of the *Chung-yung*, and flourished during the 4th century B. C. He had much intercourse with the princes and grandees of his time, and appears to have been lively in his character and ready-witted in conversation, ever ready to frown down oppression and tyranny by cutting sarcasm and well-timed parables. His work, which is larger than the three others put together, contains a record of his sayings and dialogues with various characters with whom he had come in contact; the main object of his teaching being to commend the practice of benevolence and integrity. He takes occasion also to aim his shafts at several of the heresiarchs of his time. Although, like many other philosophers in that age, he had a numerous company of disciples, he does not appear to have occupied that high position in the mind of his contemporaries which subsequent generations have accorded him. His work is said to have escaped the general burning, as being considered extra-classical; and it was not for several centuries that it was promoted to the honored rank it now holds. The Chinese text, with a Latin translation by Julien, was published at Paris in 1824. It has been translated into English by Legge (Hong Kong, 1861). There are 170 or more exegetical works on the "Four Books," and by far the most popular is Choo He's commentary, which is read in the national college of Peking. There is a Latin version of the whole, together with the *Heau-king* and the *Seaou-heo*, by Noel (Prague, 1711; translated into French by Pluquet, Paris, 1784). The "Four Books" have been translated into English by Collie (Malacca, 1828), and into French by Pauthier (Paris, 1841). The *Heau-king* is a tract extolling the virtue of filial piety and inculcating its practice, and is reckoned one of the secondary classics. It professes to be a conversation between Confucius and his disciple Tsang Ts'an, recorded by another disciple. Grave doubts are entertained as to its authenticity by many scholars. They say neither the style nor the doctrine is in keeping with its pretensions. Thirty or more exegetical works have been written on it. Besides the Latin and French translations before mentioned, there is a French one in *Mémoires concernant les Chinois* (Paris, 1779), and an English one by

Bridgman in the "Chinese Repository" (Canton, 1836). The *Urh-ya*, the last of the thirteen classics, is a kind of dictionary of terms used in the classical and other writings of the early ages. Tradition ascribes the authorship to Tsze-hea, the disciple of Confucius, and the nucleus of it is even said to have come down from Chow-kung, regent of the empire in the beginning of the Chow dynasty. The work is divided into 19 sections, according to subjects, as—1, Ancient Terms; 2, Words; 3, Phrases; 4, Kindred Relations; 5, Houses; 6, Utensils, &c.; each term being found with a brief explanation in its own special category. The oldest commentary, by Ko Po, a scholar of the 4th century, is generally published with the text. Other works have been written on the *Urh-ya*, but none of equal reputation with this. This is the type of a class of works which, though admitted as appendages to the classic division, are yet put in the lowest grade. Another work of some reputation, arranged on the same principle as the *Urh-ya*, is the *Lüh shoo koo*, written about the close of the Sung dynasty. Although there are many cyclopædias arranged on this principle, there are comparatively few works that we should call dictionaries. A more general plan is to arrange the characters under a fixed number of radicals. Several of the best known lexicons on this plan have been already mentioned. The Chinese were first initiated into the science of analyzing sounds by the Hindoo missionaries in the 5th century, and the *Yüeh pên* is the earliest extant work in which we have the system of syllabic spelling applied. This system consists in the employment of two characters to represent the pronunciation of a third,

the exponent characters being followed by 切 *ts'zë*, implying bisection. The initial of the first exponent is then to be prefixed to the final, including the tone of the second. The result is the sound of the character required. From that time began the practice of indicating the sounds of characters in the dictionaries. A third class of dictionaries is those in which the characters are arranged throughout according to the sounds; a certain number of symbols being selected as finals, to which all others with the same finals respectively are referred. These dictionaries are first divided into four parts, corresponding to the four tones, and subservient to these is the arrangement of the finals. The earliest of this class extant is the *T'ang-yun*, a production of the 8th century, with a system of 206 finals. The *Tsëh yun che chang t'oo*, a small work by the historian Sze-ma Kwang, is the first of this class in which the Hindoo system was adopted. He employs 36 initials, under which are arranged, according to the four tones, 3,130 characters. The *Le poo yun l'ö* was issued under imperial patronage in the 11th century, to rectify the disorders that were creeping into the rhymes at the examinations. The original copy had only 9,590 characters,

but in an augmented edition subsequently published the number amounted to 13,647. The *Woo yin tsëih yun*, which appeared about the end of the 12th century, contains 53,524 characters, and reduces the number of finals to 160, under each of which the characters are referred in order to the 36 initials. In the 13th century, Lew Yuen of Ping-shwuy again reduced the number of finals to 107, and his system with slight variations has continued in use to the present time. The *Hung woo ching yun*, which was published under the immediate patronage of the first emperor of the Ming dynasty, reduces the number of finals to 76. Although this work is well known, it never came into general use. About the commencement of the present dynasty, Koo Yen-woo, a scholar of great talent and acquirements, wrote several small works of this class. P'wan Luy, one of his pupils, was the author of the *Luy-yin*. In this he makes a selection of 147 finals, and increases the number of initials to 50. He treats largely of the modern changes in pronunciation. The *Woo chay yun suy*, published in 1592, is arranged according to the 106 finals. The *Yin yun ching go* is a concise work of modern date, arranged according to 65 finals. The *Woo chay yun foo*, published early in the 18th century, has 36 initials and 128 newly selected finals. The *Woo fang yuen yin*, a dictionary of the Mandarin dialect, published in 1710, has 12 initials and 20 finals. The *Pei wän yun foo*, compiled under the special superintendence of the emperor and published in 1711, is arranged according to 106 finals distributed among five tones. It is usually bound in 110 thick volumes, and is probably the most extensive lexicon ever published. The quotations from preceding works are extremely numerous and complete, far exceeding anything of the kind that had been done before. Works of this class are very numerous, and much more used by students than the radical division.—In the number and extent of their histories the Chinese stand unrivalled. Their dynastic history alone is a marvel. During the Sung dynasty the "Seventeen Histories," including so many dynasties, were published in a single work. Under the Ming a corresponding work was issued, with the title of the "Twenty-one Histories;" and during the present dynasty the "Twenty-two Histories" and "Twenty-four Histories" have successively appeared. These are the work of nearly as many authors, the history of each dynasty being generally written in the period of its successor, with all the advantages of access to the national archives; and several of the authors stand high in the literary scale. The last named collection, beginning with the *She ke*, and ending with the *Ming she*, or "History of the Ming dynasty," numbers in all 3,264 books or sections, and averages probably two or three of these books to a volume. The whole are written on a generally uniform plan, though each differs somewhat in detail, and there is much diversity

in the style of execution; Pan Koo's *Ts'een han shoo*, or "Book of the Former Han," for instance, being looked up to as a model, while scholars are lavish of their censures on the historian of the Sung. As a rule, each history is divided into three sections: 1, "Imperial Records," containing a succinct chronicle of the several reigns of the dynasty; 2, "Memoirs," consisting of a succession of articles on astronomy, rites, music, jurisprudence, political economy, state sacrifices, uranography, meteorology, geography, and literature, giving the state of these various subjects during the dynasty; 3, "Narratives," in which are included biographies of all persons of eminence, and short historical statements regarding foreign countries. The *She ke*, by Sze-ma Ts'een, in 130 books, the first of the series, is much praised for its style, and is exceptional in its arrangement. Commencing with the mythical period of Hwang-te, it reaches down to the emperor Woo-te of the Western Han. A great part of the materials had been collected by Sze-ma T'an, the father of the author. It is divided into five sections: 1, imperial records; 2, chronological tables; 3, eight treatises on rites, music, harmony, chronology, uranography, sacrificial service, watercourses, and weights and measures; 4, genealogical history of the princes; 5, narratives of persons and countries. Much of the original work is lost. There are double histories, the old and the new, of the Tang dynasty, and also of the five dynasties succeeding, both of which are admitted into the standard collections. The new histories of both these are by Gow-yang Sew, a scholar of established reputation early in the Sung. In the *Sin woo tae she*, or "New History of the Five Dynasties," he has departed somewhat from the beaten track, both as to style and arrangement. He omits the memoirs altogether, and divides his work into five sections: 1, imperial records; 2, narratives; 3, researches; 4, genealogical registers; 5, appendix. It was printed by orders from the emperor, after the author's death. Another class of histories may be termed annals, giving the consecutive run of events as a whole chronologically arranged. The *Ch'un ts'ew* of Confucius is undoubtedly the earliest example of this kind; and the next in pretension is the *Ch'üeh shoo ke n'een*, or "Bamboo Annals," which we are told was found in the tomb of one of the Wei princes, A. D. 284, supposed to have been there for several centuries. The record, which was on slips of bamboo, began with the fabulous reign of Hwang-te, and extended to 299 B. C. It is the general conviction that the original text has been long lost, and that the book now bearing that name is a fabrication. There are some things however that favor a belief in its genuineness. (French by Biot, Paris, 1842; English by Legge, Hong Kong, 1865.) The records of several of the dynasties have been written separately in this fashion, but the most celebrated production is the great

work of Sze-ma Kwang, entitled *Tsze che t'ung k'een*, on which he was engaged for 19 years, in the latter part of the 11th century. This, with the various appendices, comprising 326 books, embraces a period from the commencement of the 4th century B. C. down to the end of the five dynasties preceding the Sung. A prefix to this history, entitled *T'ung k'een wae ke*, in 10 books, was composed by Lew Shoo, the associate of Sze-ma Kwang; beginning with the myths of the fabulous period of Füh-he, it ends at the place where the *T'ung k'een* begins. About a century after the time of Sze-ma Kwang, the *T'ung k'een kang m'üeh*, which is a reconstruction and condensation of the *T'ung k'een*, was drawn up under the direction of the celebrated Choo He. The first book only, on the principles of the work, is from the hand of Choo himself, the remainder being compiled by his pupils under his guidance. The whole is compressed into 59 books. An elucidation of this was afterward published by Yin K'e-sin in 59 books. Lew Yew also wrote a treatise on the principles adopted in the composition, in 50 books, on which he was occupied for 30 years. Wang K'ih-k'wan, in the early part of the 14th century, wrote an examination of the discrepancies connected with Choo's work. During the Yuen dynasty, Wang Yew-h'ëö published his researches on the *T'ung k'een kang m'üeh*. In 1359 Seu Chaou-w'än completed a critical examination of the same. Early in the Ming, Ch'in Tsie published his correction of errors, being the result of a minute investigation of the *Kang-m'üeh*. In 1465 Fung Che-shoo published his illustrations of the *Kang-m'üeh* drawn from other sources. About the close of the 15th century, Hwang Chung-chaou dissected these last mentioned seven works, placing each paragraph under the corresponding part of the *Kang-m'üeh*, when the work assumed the form it has retained to the present day, a very valuable compendium of history, the result of a vast amount of erudition. There is a French translation by De Mailla (*Histoire générale de la Chine*, 13 vols., Paris, 1777-'85). During the Sung, Kin Le-ts'ang wrote an additional section, carrying the history back to the time of the monarch sage Yaou, and from that down to 431 B. C., where Choo's work commences. A further portion was afterward composed by Ch'in King, extending back to the fabulous era of Füh-he. These two last portions were combined into one by Nan H'een in the Ming dynasty. In accordance with an imperial rescript issued in 1476, a supplement to Choo's history was composed by a committee of 15 scholars. Near the close of the Ming, these several sections were revised and published as a single work, by Ch'in Jin-s'eh, the national historiographer. It was divided into three parts, known respectively as the introductory, principal, and supplementary sections. Having been again revised and submitted for imperial inspection, it received the imprimatur in 1708,

and a new edition was issued in 91 books, under the title *Yu p'e tung k'een kang m'uh*. The *Fung-chow kang k'een tseuen p'een* is an abbreviated history in 32 books, by Wang Fung-chow, and embraces the period from Füh-he down to the end of the Ming dynasty. Morrison drew his historical information from this work, when composing his "View of China for Philological Purposes" (Macao, 1817). The *Kang k'een e che l'uh*, by Woo Shing-keuen, is an abridgment of the *T'ung k'een kang m'uh*, from the commencement of history to the close of the Ming dynasty. A considerable portion of this work, from the time of the monarch Yaou to B. C. 722, has been translated by Medhurst, and printed as an appendix to his *Shooking*. In this class of books, every year, besides being headed by the year of the monarch's reign, or some portion of his reign with a special designation, is also marked by two characters of the sexagenary cycle, thus providing a double check against error in the chronology. This cycle is formed by the combination in pairs of two series of characters, one numbering 10 and the other 12. In the most ancient works the cycle of 60 is never used for the years, but only for the days. In the dynastic histories it is used for both the years and days. In the *Kang-m'uh* it is very sparingly employed for the days.—A third class of histories may be designated "complete records," deviating as they do from the formal divisions of the dynastic histories, and paying little regard to the restraints of mere chronological technicalities. Dealing with every historical event *per se*, they bring all kinds of incident and information to bear on the matter in hand, regardless of contemporary questions which have no immediate bearing upon it. The histories of several of the dynasties have been written on this plan; but one of the principal works of the kind is the *Y'ih she*, a chronicle by Ma Süh of the present dynasty, in 160 books. The subjects treated extend from the creation down to 206 B. C. The *T'ung che* is a historical work belonging to still another class, which has been termed "separate histories." The plan is very much the same as that of the dynastic histories, but they are not limited as to the stretch of time they embrace, whether it include a great number of dynasties or merely one. The work just named is a history of the empire from Füh-he down to the Tang dynasty. The division of the work is into imperial records, biographies of empresses, registers, compendiums, and narratives. Matters of much interest are found in the compendiums. It was composed in the Sung dynasty by Ch'ing Tseou, and is in 200 books. The *T'ung t'een* is a work not unlike the preceding in character, though some native writers place it in a different class. It also consists of 200 books, and was composed by Too Yew, a scholar of the Tang. It is divided into eight sections, on political economy, literary graduation, government offices, rites, music, military discipline, geography, and na-

tional defences. It extends from the earliest period of history to the middle of the 8th century, and is a work highly esteemed by the Chinese. The *Wän k'een t'ung k'aou*, by Ma Twan-lin of the Sung, is a work well known to European scholars, from the frequent quotations and extracts made by sinologues. It consists of 348 books, which include a period from the commencement of history to the early part of the 13th century, very near the author's time. He has expanded the eight sections of the *T'ung t'een* into 19, and added five more, on bibliography, imperial lineage, appointments, uranography, and phenomena. It has been wrongly named a cyclopædia by Europeans. These three works are looked upon as a set by the natives, who call them the *San t'een*, or "Three Canons." A supplement to Ma Twan-lin's work was completed by Wang K'e in 1586, consisting of 254 books, bringing it down nearly to the end of the Ming. This continuation was revised by imperial commission, and an order issued in 1767 for the composition of analogous supplements to the *T'ung t'een* and *T'ung che*, which were completed, bringing the whole down to the close of the Ming. A second supplement to all the three was also executed by imperial commission, extending the details to the 18th century. These contain a great fund of valuable and interesting matter, but unfortunately the text is very full of typographical errors.—There is a class called "Miscellaneous Histories," as a specimen of which may be mentioned the *Nan keang y'ih she*, a work in 30 books, composed about the end of the last century, under imperial patronage. The subject is the unsuccessful efforts of the last three descendants of the Ming family, Füh-wang, Tang-wang, and Yung-ming-wang, to reestablish the falling dynasty. It contains records of the princes and biographies. Many eventful episodes find a place in this class.—Biographies, including autobiographies, personal adventures, and travels, form a very numerous and interesting class, and extend over the whole range of Chinese history from several centuries before the Christian era. The *Kaou sze chuen*, composed about the 4th century, contains the biographies of 96 scholars. The *T'ang tsae tsze chuen*, the work of a foreigner from the west during the Yuen dynasty, contains the biographies of 397 authors and authoresses during the Tang and succeeding five dynasties. The *Mwan chow ming chin chuen* is an imperial work in 48 books, containing biographical memoirs of all the famous Mantchou ministers up to the middle of the last century. There is a similar record of the Chinese ministers of the present dynasty, entitled *Han ming chin chuen*. The *Koo l'è neu chuen* is a biography of famous women, written by Lew Heang in the 1st century B. C. There are a great many female biographies published at various times. The *Ta tsze gän sze san tsang fä sze chuen* is a history of the life and travels of the famous Buddhist priest Heuen-chwang,

but the book is very rare. (French by Julien, Paris, 1853.) The *Se she ke* is a short but interesting sketch of the progress of the Mongol army under the conqueror Hulagu, through central Asia, as far as Bagdad, from the year 1252 to 1259. The narrative is given by Ch'ang Tih, an envoy from the camp to the Tartar court at Karakorum. This has been frequently reprinted, sometimes in a separate brochure, and sometimes forming part of a collection. (French by Rémusat, Paris, 1829; and by Pauthier, 1865.) The *E yih lüh* is an account of an embassy through Siberia and Russia to the Tartar settlements on the Volga. (English by Staunton, London, 1821.) The *Tsing hae fun ke* is a narrative of the adventures of a notorious pirate fleet in the China seas. (English by Slade, in the "Canton Register," 1829; and by Neumann, London, 1831.) The *Ch'ow jin chuen*, a biography of philosophers in 46 books, appeared in 1799, from the pen of the well known scholar Yuen Yuen, formerly governor of Canton. Recently a supplement of six books has been added. Besides memoirs of all the celebrated men of science in China, the last three books form an appendix, treating altogether of foreign astronomers and mathematicians; among whom are found Meton, Aristarchus, Euclid, Clavius, Newton, and Cassini; and the Jesuit missionaries Ricci, Ursi, Aleni, Longobardi, Diaz, Terence, Rho, Schall, Verbiest, Stumpf, Smogolenski, Kögler, Pereyra, &c. There are also a number of Buddhist biographies, some giving an account of the Indian founders and luminaries of the faith, as the *Che yüé lüh*; and others recording the lives of those who have attained distinction in China in the same body, as the *Kaou säng chuen*, and the supplement to the same. When it is remembered also that more than half of the dynastic histories are occupied with personal memoirs, it may be imagined how much reading of this kind is included in the national literature.—"Historical Excerpts" also form a distinct class, and although it includes some tolerably voluminous works, they are not so numerous as most of the other classes. As an example may be noticed the *She wei*, in 330 books, published early in the present dynasty, consisting of choice extracts from the national history. As the term *king* was above explained to mean originally the warp of cloth, and metaphorically classic literature, so here the word *wei*, which is the counterpart of *king*, means originally the woof, and in its metaphorical sense implies the equal necessity of this to complete the great web of history.—"Contemporary Records" as a class includes the histories of various states holding an independent status beside the central government of China. Such is the *Shih lüh kwó ch'un ts'ew*, a history of 16 dynasties that existed contemporaneously with the Tsin and Sung. The names of these states are the Former Chow, After Chow, Former Yen, Former Tsin, After Yen, After Tsin, Southern Yen, Hea, Former Leang, Shuh, After

Leang, Western Tsin, Southern Leang, Western Leang, Northern Leang, and Northern Yen. The original work of this name, in 102 books, written about the 5th or 6th century, is lost; and the present work, composed during the Ming, is one of the most ingenious literary frauds on record. The *Gan nan che lüè*, in 19 books, is an account of Anam, by a native of that country who sought refuge in China after having surrendered a city to the Mongol troops in the reign of Kublai Khan. A small class consists of "Chronicles of the Seasons," such as the *Suy she kuang ke*, a work of the Sung, detailing the natural indications of the months throughout the year, with the particular duties attaching to each.—Geography is a very voluminous class, if we include topographical works in the designation. The *Shan hae king*, or "Classic of Hills and Seas," is a small work full of monstrosities, and only claims notice on account of its great antiquity, as it is thought by some competent critics to be at least as old as the Chow dynasty. The *Ta ts'ing yih t'ung che*, in 500 books, is a carefully compiled geography of the empire, comprising an amazing amount of statistical information. The general plan of the work is to describe in succession the several provinces of the empire, noting the astrological division, limits, configuration of the country, officers, population, taxes, and renowned statesmen belonging to each. Under each prefecture and department there is a more detailed description of the various districts, descending to additional particulars regarding the cities, educational institutes, hills and rivers, antiquities, passes, bridges, defences, famous tombs, temples, men of note, travellers, remarkable women, religious devotees, and productions of the soil. A considerable section at the end is devoted to a description of the extra-frontier dependencies and foreign nations. This in itself is a huge work, but it sinks into insignificance when compared with the mass of topographical writings, which number thousands of volumes. For each of the 18 provinces there is a *T'ung che*, or "Provincial Topography," which may be considered a greatly amplified development of the headings in the last named work. As an example take the *Ch'è keang t'ung che*, or "Topography of Chekiang Province," in 72 books, which, although scarcely above half the size of some of them, is considered a very favorable specimen as to the general plan and execution. In this province there are 11 *foo* or prefectures, each of which has its *foo che*, or prefectural topography. Take as one of these the *Ning-po foo che*, or "Topography of Ningpo Prefecture," the first edition of which appeared in 1730, in 36 books. In this prefecture are 6 *heën*, or districts, to each of which there is a *heën che*, or district topography; as for instance the *Yin heën che*, or "Topography of Yin District," in 30 books. These are by no means the most voluminous of the series, and when it is remembered that there are 267 prefectures and 1,473

districts in the empire, and that each of these with rare exceptions has its record, some idea of this mass of detailed minutiae may be formed. But even this does not include the whole; for there is a very extensive series also of similar accounts of famous hills, lakes, rivers, and places of note, such as the Bohea hills, Pootoo island, Silver island, the Western lake at Hangchow, and others far too numerous to refer to. There are many accounts of neighboring countries also; as the *Ch'au seën che*, a description of Corea written by a native of that country. The *Chin lä fung t'oo ke* is a description of Cambodia, written by a member of a Chinese embassy to that country in 1295-7, and is now the only authentic account in any language of the state of that country in the ancient days of its prosperity. (French by Rémusat, with a map, in *Nouvelles annales des voyages*, vol. iii.; without the map, in *Nouveaux mélanges asiatiques*, 1829.) The *Wei tsang t'oo shih* is an account of Thibet. (French by Klaproth, Paris, 1831.) The *Hae taou yih che* is an account of Java and the Malayan archipelago. (English by Medhurst, "The Chinaman Abroad," Shanghai, 1849.) The *Se tsang ke* is a record of the country and customs of Thibet, with an itinerary at the end. There are a number of interesting accounts of central Asia by Chinese Buddhist travellers in different ages. The *Füh kwó ke* contains an account of the travels of the priest Fä-hên through Turkistan and India in the 5th century, where he went to investigate the state of Buddhism. (French by Rémusat, Paris, 1836; new ed., with illustrations, in Charton's collection, 1862.) In the *Ló yang kea lan ke*, a description of the temples in Lo-yang, the metropolis of the Northern Wei dynasty, is a similar account of a mission of Buddhist priests in the 6th century. (German by Neumann, Berlin, 1833.) The *Ta t'ang se yih ke* is an account of 138 kingdoms of central Asia, translated chiefly from the Sanskrit, by Heuen-chwang, a Chinese priest who had travelled through most of these countries, during an absence of 16 years from his native land. (French by Julien, 2 vols., Paris, 1857.) The geography of Commissioner Lin, *Hae kwó t'oo che*, in 50 books, is a description of the world, first issued in 1844. The latest edition is enlarged to 100 books. A later production, the *Ying huan che lëb*, by Seu Ke-yu, formerly governor of Fo-kien, and now (1873) holding a high official post in the capital, though less bulky, is on the whole a much better account of the nations of the world. The maps, though very sparsely filled with names, are correct in the general outlines. The *Kwang yu ke*, a geography of the empire in 24 books, written about the commencement of the 17th century, is very useful as giving the ancient names of places at different periods.—A small number of books have been classed together as "Official Repertories," treating of the numbers and duties of various classes of officers of the empire, such as the *Leih tae chih kwan peau*, in 63

books, which consists of a series of tables of the officers of the several departments of government, and the changes that have taken place in the names and duties of the respective offices, from the earliest times to the present dynasty.—"Works on the Constitution" comprise some very formidable productions; as the most voluminous of which may be named the *Ta ts'ing hwuy t'ien*, in 80 books, giving a development of the general principles of the government under the present dynasty. There is an accompanying section of illustrative plates in 132 books; and a very imposing supplementary section in 920 books, consisting of a historical detail of the changes that have taken place in the several departments of the government since the commencement of the dynasty. Separate works also exist on the governmental regulations of each of the six supreme boards, and also of several of the subsidiary ones. A code of laws of the empire is published in 47 books, with the title *Ta ts'ing leih le*, a book remarkable for the clearness of its phraseology, the reasonableness of its stipulations, and the general consistency of its ordinances throughout. (English by Staunton, London, 1810; French by Sainte-Croix, Paris, 1812.)—"Catalogues," under which head are included books on inscriptions, are also tolerably numerous. The catalogue of the *Sze koo tseuen shoo* library, with the historical and critical information appended to each title, forms one of the finest specimens of bibliography possessed by any nation. The *Wän yuen kó shoo mûh* is a catalogue of the imperial library of the Ming dynasty. It was republished in 1800 in 20 books, a bare list of titles. The *Wûh gan leih swan shoo mûh* is a catalogue of the mathematical and astronomical works written by Mei Wûh-gan, compiled by himself, containing much curious information on the state of the science in China. The *Kin shoo mûh lûh* is an *index expurgatorius*, in two parts, the first containing works of which parts only are objectionable and forbidden; the second consists of books that are condemned *in toto*. There are several ten thousands of volumes in all, chiefly written about the close of the last dynasty, and nearly all of a political tendency. Other lists are in circulation comprising a long array of novels and light reading, forbidden in consequence of their licentious tendency. The most complete work on inscriptions is the *Kin shih tsuy peën*, in 160 books, a comprehensive collection from nearly 2,000 before Christ to the beginning of the 13th century of our era. The texts are given *in extenso*, and much critical addenda.—Although native scholars altogether exclude novels from a place in their literature, yet they are in fact a very important and influential class of reading, forming as they do the views and opinions of the large mass of the people on the history of their own country, being almost the only source from which they gather any ideas on the subject at all. They are not so numerous, however, as might be expected under the

circumstances; nor do they to their readers lose any of their freshness with age. They are more or less colloquial in language, and are studied by foreigners as exercises in the Mandarin dialect. From one and another a tolerably connected view of history may be obtained. In the *Fung shin yen e* we have the adventures of Woo-wang, son of the founder of the Chow dynasty, about the 12th century B. C. The *Liè kwò che* embraces the last five or six centuries of the same dynasty. The *Se han yen e* covers the first two centuries B. C., being the story of the Western Han popularized; and the *Tung han yen e*, which is a corresponding tale of the Eastern Han, includes the first two centuries of our era. The universally read and most popular story of the *San-kwò che yen e* turns altogether on the troubles that followed on the overthrow of the Eastern Han, when the country was divided into three states, embracing the period from 168 to 265. (French translation of the first 44 chapters, by Pavie, 2 vols., Paris, 1845.) The *Nan pih chaou yen e* describes the succeeding period, when the empire was divided between the northern and southern dynasties. The *Suy t'ang yen e* is a popular record of the Suy and Tang dynasties. The *Tseen t'ang* relates the downfall of the Tang dynasty. The *T'ang woo tae chuen* gives the latter part of the Tang with the succeeding five dynasties. The *Showuy hoo chuen* is a tale of brigandage about the close of the 11th century; and the *Shwò yò tseuen chuen* is founded on the history of Yò Fei, a famous general of the 12th century. The *Se yew ke* is a mythical account of the adventures of Heuen-chwang, the Buddhist priest who went to India in search of Buddhist books in the 7th century. The *Kin ping mei* is a picture of the dissolute manners of the age at the beginning of the 12th century. As a literary work it stands high, but is condemned for its immoral character. The *Se yang ke* is an apocryphal history of the expedition of the eunuch Ching Ho to subdue the refractory nations of the southern ocean, at the commencement of the 15th century. The *Ching tih huang yew keang nan chuen* recounts the adventures of the emperor in a supposed incognito journey through Kiang-nan province in the 16th century. (English by Tsin-shen, Malacca, 1846.) Life in the metropolis during the present dynasty is depicted in the *Hung loo mung*, written in a very colloquial dialect. The *Haou kew chuen* ("The two Fair Cousins") is a tale of social life. (English by Percy, London, 1761; French, Lyons, 1766; German by Marr, Leipsic, 1766.) The *Yüh keau le* is also a picture of domestic manners. (French by Rémusat, Paris, 1826; by Julien, 1864; English, London, 1827.) The *Ping shan lang yen* is more admired for the language than the plot. (French by Julien, *Les deux jeunes filles lettrées*, Paris, 1860.) The *Leaou chae che e* is a popular book of fairy tales, or rather stories of elfin foxes and such like, by P'oo Sung-ling,

and published by his grandson in 1740. There are in all 300 of these legends, collected by the author chiefly from the mouths of the people, among whom there is a strong belief in the possession of foxes by these ethereal sprites. The *Kin koo ke kwan* is a small collection, as the name implies, of marvellous tales of fiction relating to ancient and modern times. The *Lung'oo kung yan* is a series of *causes célèbres* in the Chinese courts of justice, giving a curious insight into some of the more tortuous cases of jurisprudence among them.—In contrast with the preceding, there is a class of authors termed orthodox writers, who are deemed the special upholders of the doctrine of Confucius, and whose works are assumed to be the proper objects of study for all who aspire to eminence in the government or the school of the literati. Every age has had its men of mark in this school, and, comparing the writings of various authors, we find considerable latitude of views among them. Before the Christian era we have such names as Seun Hwang, the opponent of the views of Mencius regarding the original rectitude of human nature, whose writings are known by the title *Seun tsze*; Kea E, the author of the *Sin shoo*; Lew Heang, author of the *Sin seu* and *Shwò yuen*; and Yang Heung, author of the *Fä yen* and other works. It would be easy to go on from age to age, quoting such scholars as Han Wän-kung, Lin Shin-sze, and a host of others; but the period that calls for special notice is the 11th century, which forms an epoch in the history of the orthodox school. The philosophic views first propounded by Chow Leen-ke were followed up by Chang Ming-taou and the two brothers Ch'ing Haou and Ch'ing E. The renowned philosopher of China, Choo He, was the pupil of Ch'ing Haou, and by his writings gave a lustre to that school of teaching, that has been able to bear down all opposition. These men thought out for themselves a system of the universe, and formed a theory according to which all nature was developed by a process of evolution from a primal monad, or even something beyond that. The writings of Choo on natural and ethical philosophy have had a wonderful influence over the native mind. In 1713 the emperor ordered a collection to be made of the principal of Choo's philosophical works, which were published under his immediate supervision, with the title *Choo tsze tseuen shoo*. One of his most widely popular productions is a small work for the instruction of youth, entitled *Seaou hëö*. (Latin by Noel, Prague, 1711; French by Pluquet, Paris, 1784; the first two out of six books in English by Bridgman, in the "Chinese Repository," Canton, 1837-'8.) It was one of Choo's pupils, Ch'in Chun, who first introduced the term *Sing le* as the designation for mental philosophy, and a number of works have been since written on that science. The third emperor of the Ming had a collection made of all the principal writings

on this subject, embracing the productions of 120 scholars, which was published in 1415, with the title *Sing le ta tseuen shoo*, in 70 books. This was revised by an imperial commission in the last century, and compressed into 12 books, with the title *Sing le tsing e*. Several of the monarchs of the present dynasty, as preceptors of the people, have written hortative and didactic works, enforcing Confucian ethics. In 1655 a treatise of this kind, under the title *King sin lüh*, was issued by the first emperor. It is divided into seven parts, and directed against heart vices. The *Shing yu kwang heun*, or "Homilies on the Sacred Edict," consists of 16 maxims by Shing-tsoo, the second emperor of the present dynasty. A short homily was added to each of these by the succeeding emperor in 1724, and orders were issued to have one of these read and explained to the people of every district, on the 1st and 15th of each month. (English by Milne, London, 1817.) Several elementary school books may be mentioned as belonging to this class, small in size, but widely known and read. The *San tze king* or "Trimetrical Classic," is a tract written in columns of three characters each, the subject matter including the elements of history, morals, and relative duties. Of this and the next there are several translations in English, French, and German. The *Tseên tze wân*, or "Thousand-Character Classic," is a small work consisting of 1,000 different characters, said to have been thrown together promiscuously, from which the author formed this rhyme, in lines of four characters each, in a single night. (Latin by Hoffmann, Leyden, 1840.) These two tracts form the preliminary studies of the school room, and are memorized by the scholars. Another little book which is in very common use is the *Yew hëö she*, or "Odes for Children." (English by Bridgman, in the "Chinese Repository," Canton, 1836.) The *Pih kea sing* is a mere catalogue of 454 of the family names of China, and is one of the elementary school books.—Works on agriculture form an important though not a very numerous class. Under this head native writers include the art of grazing, breeding cattle, rearing silkworms, and a variety of collateral branches of industrial science. A famous work of this kind is the *Nung ching tseuen shoo*, a cyclopædia of agriculture, as it has been termed, in 60 books. It is the production of Seu Kwang-ke, an early disciple of the Jesuits in the 17th century, better known to Europeans by the name of Paul Seu. After a series of pertinent quotations from the classics, he treats of the division of land, processes of husbandry, hydraulics, including European methods, agricultural implements, rearing silkworms, planting trees, breeding stock, manufacture of food, and provision against dearth. A still more comprehensive work was compiled by imperial order in 1742, with the title *Show she t'ung k'aou*.—Medical treatises are exceedingly numerous and various in their subjects. Medi-

cal practice in China, it is true, stands very low in comparison with European science; yet, considering the attention that has been given to the subject for 2,000 years, it is scarcely reasonable to condemn *in toto* their medical literature till we know something more about it. The medical art is divided by them into nine branches, relating respectively to the main arteries and blood vessels, their ramifications, fevers, female complaints, cutaneous complaints, cases of acupuncture, eye complaints, throat, mouth, and teeth complaints, and bone diseases. Each of these departments has its literature, while there are also very many works of a general character. The *Tung e paou keen*, a large work of Korean origin, embraces the whole compass of medicine, and has been several times republished in China. Books of prescriptions are very numerous. Materia medica has also received a considerable share of attention, as may be seen by the large work of Le She-chin, the *Pun ts'au kang mûh*, in 52 books, on which the author was engaged for 30 years, having made extracts from upward of 800 preceding authors. It is in fact a kind of natural history, embracing the three kingdoms of nature, the subjects being arranged under the several divisions of water, fire, earth, minerals, herbs, grain, vegetables, fruit, trees, garments, and utensils; insects, fishes, crustacea, birds, beasts, and man. It was written toward the end of the Ming, and several editions have been published during the present dynasty. The nucleus of the work is traditionally ascribed to the half-mythical Shin-nung.—Works on astronomy and mathematics, though tolerably numerous, have a somewhat limited circle of readers, yet these are among the *élite* of Chinese intellects. The oldest work on this subject is the *Chow pe swan king*, a tract on the elements of trigonometrical observation and the rudiments of astronomy. It is thought to be a relic of the Chow dynasty. (French by Biot, Paris, 1842.) The *Sin e seang fä yaou* was written by Soo Sung at the close of the 11th century. The author had constructed a large celestial globe, with machinery to represent the mechanism of the heavens and illustrate the seasons, the whole set in motion by water power. The work named was written specially to explain the theory of these movements. The *K'ih seang sin shoo*, by Chaou Yew-k'in, appeared during the Yuen dynasty, and differed in several particulars from the orthodox views of the time. It ascribes the length of the day, not to the distance of the sun, but its altitude, and the heat of the atmosphere to the accumulation of air. The planets are made to circulate round the earth in parallels of declination, while they revolve round the pole of the ecliptic in tortuous paths. It ascribes the apparent increase in the size of the sun near the horizon to its nearer approach to the earth than when in the zenith. In other matters also it deviates from the received doctrines. On the arrival of the Jesuit astrono-

mers in the 17th century, a great revolution took place in the native theories; the result of which was the compilation of the *Sin fā swan shoo*, in 100 books, about the year 1634, by an imperial commission consisting of natives and Europeans. It is divided into 11 parts, treating respectively of the elements of the system, standard numbers, calculations, instruments, general operations, sun's course, fixed stars, moon's path, nodes and conjunctions of sun and moon, five planets, and nodes and conjunctions of the five planets. The Ptolemaic theory is still adhered to, but Tycho Brahe's discovery of the variation in the obliquity of the ecliptic is stated, and his numbers adopted for that and other elements, as also his solar and lunar tables. The European astronomers were received even more favorably on the establishment of the present dynasty than they had been during the Ming, and their influence is apparent in the great thesaurus entitled *Leüh leih yuen yuen*, compiled under the direct superintendence of the emperor in the first half of the 18th century. This is composed of three parts; the first, entitled *Leih seang k'aou ching*, on astronomy, has several points of divarication from the great work of the Ming. The obliquity of the ecliptic is given from native observation as $23^{\circ} 29' 30''$, being two minutes less than Tycho Brahe's statement. In the correction for the sun's velocity, the new work takes account of the minute motion of the perihelion, and the epoch is changed from 1628 to 1683, but the Ptolemaic theory is still retained. In a supplementary portion, however, the elliptic orbits of the planets are suggested, and Kepler's law of equal areas in equal times is stated. The sun's parallax is given as 10 seconds, instead of 3 minutes, the old number. The circulation of Mercury, Venus, and Mars about the sun is also named, but the whole are still made to revolve about the earth as a centre. The second part of the great work, entitled *Soo le tsing yun*, is on pure mathematics, treating of the theory and use of numbers, geometry, and mensuration, with a description of the European system of algebra, and tables of the numbers of trigonometry and logarithms. The third part, entitled *Leüh leu ching e*, is on music, including a description of the European system, by Thomas Pereyra. The *Ts'ih yuen hae king* is a work on trigonometry by Le Yay, finished in 1248. This is remarkable as being the earliest book containing the *T'een yuen*, a native system of algebra, about which a great deal has been written during the present dynasty.—Although nearly all the dynastic histories have a portion specially allotted to divination, there are few separate works on the subject extant earlier than the Tang dynasty. From that time on there has been no lack of a constant supply, every age having added to the accumulating mass. Under this head are included works on astrology, geomancy, divining by the tortoise, by straws, by diagrams, and in a variety of other ways. The *Hè ke*

peën fang shoo is the authorized guide to astrology, published under imperial patronage in 1741. The astrological portion of the almanac is composed according to the principles laid down in this treatise.—Cyclopædias as a class embrace a variety of bulky works, combining to some extent the characteristics of our cyclopædia and concordance. So early as the 2d or 3d century we find it was the custom to make digests of the national literature for the emperor's inspection, and thus originated the class under consideration. Methodically arranged according to subjects, under each heading extracts from former works on the topic are given. Some of the more important of these thesauri were compiled by imperial commission during the Sung dynasty, as the *Sze luy foo*, in 30 books, composed in anomalous verse with a running commentary by the author, Woo Shüh; the *T'ae ping yu lan*, in 1,000 books; and the *Ts'ih foo yuen kwei*, also in 1,000 books. The *Yüh hae*, in 200 books, was also published under imperial patronage in the 12th century. Even these voluminous collections, however, are but pigmies compared with the work that was carried through by the second emperor of the Ming dynasty. With a printed library of 300,000 books, and more than double that number in manuscript, he conceived the idea of resolving the whole into a monster cyclopædia. A commission was appointed to dissect the whole of the existing volumes, classical, historical, philosophical, and literary, embracing astronomy, geography, the occult sciences, medicine, Buddhism, Taoism, and the arts. Three presidents of commission were appointed, under whom were 5 chief directors and 20 sub-directors, besides 2,169 subordinates. The work was completed about the end of 1407, numbering in all 22,877 books, besides 60 books of contents, and was entitled *Yung lö ta t'ien*. A copy was made from the original draught, but the government was deterred from printing by the great outlay that would be necessary. Two other copies were made in the 16th century, but during the troubles that ensued at the close of the Ming, or previously, the original draught and two of the copies were consumed by fire. On the restoration of peace only one of the copies was to be found, and that was deficient 2,422 books. By this manuscript collection 385 ancient and rare works have been preserved, which otherwise would have been irrecoverably lost. Many of these have been since reprinted.—Under the term "Minor Authors" are included a host of works, chiefly miscellaneous narrations, records of marvels, traditions, and anecdotes. A good specimen of the class is the *Yew-yang tsä tsoo*, in 20 books, written in the 8th century. It treats largely of the strange and the supernatural, but it is useful in the investigation of many archæological questions. The *Chuë kang lüh*, in 30 books, was written at the close of the Yuen dynasty, and contains a number of notices regarding the downfall

of the Mongol empire. There is a good deal of miscellaneous information about the affairs of that dynasty, and some few notices relating to countries in the west. The books of the Buddhists alone would form a tolerably extensive library. The translation of Sanskrit works into Chinese was commenced in the 1st century, and continued almost without interruption till the 9th, during which period they added from 2,000 to 3,000 works to the literature of China; and some of these translations are now the only examples of the works to be found in any language, the originals being lost. By far the greater portion of these belong to the three classes *K'ing*, "Classic," *Leïh*, "Discipline," and *Lun*, "Metaphysics;" corresponding to the Sanskrit *Sūtra*, *Vinaya*, and *Shāstra*, including the *Dhāraṇī*, or "Charms." The remaining are chiefly biographical and descriptive, including the *Avadānas* and *Āgamas*. The *Lalitā vīstara*, a life of Buddha, has been four times translated into Chinese, with as many different titles, about the years A. D. 70, 308, 652, and one subsequent. An abstract has also been published under the title *Ching taou ke*. Besides the translations, there is a considerable body of native Buddhist literature, among which may be mentioned the *Fū yuen ch'oo lin*, in 120 books, completed in 668, a comprehensive cyclopædia of the Buddhist religion, detailed in 100 sections.—Among the writings of the Taoists, the *Taou t'ih king* of Laou Keun, the reputed founder of the sect, will ever stand preëminent. Written in classic diction, and embodying as it does some profound speculations, it has attained an exceptional reputation, and even the fastidious literati think it no shame to study the treatise of the old philosopher. (French by Julien, Paris, 1842; English by Chalmers, London, 1868; German by Pläneckner and by Strauss, both Leipsic, 1870.) *Leïh tsze* and *Chuang tsze* are two works of the same school, named after their respective authors, who wrote several centuries before the Christian era; and the very age of their productions has insured them a certain degree of deference as ancient writers. Later down in the stream of time we find a great deterioration in Taoism. Gradually its professors gave themselves up to the study of alchemy, the search after the philosopher's stone, the use of charms and amulets; rituals were introduced and images set up in the temples. Thus we have the *T's'an t'ung k'e*, a treatise on alchemy written in the 2d century; and the well known work of K'ö Hung in the 4th century, under the title *Paou p'ö tsze*, is a treatise chiefly on the immortals, alchemy, charms, exorcism, &c., with a section on government and politics. Leu Tung-pin, who flourished during the Tang dynasty, one of the reputed eight immortals, is also a name recognized in the world of letters. His original compositions are published under the title *Leu chin jin wän tseïh*, literary and poetical, color-

ed by Taoist views. The *T'ae shang kan ying p'een*, or "Book of Rewards and Penalties," professing to be the work of the founder, appears really to be a production of the Sung, but the author is not known. The object of the book is to elucidate the doctrine of future retribution, and it has attained a greater popularity than any other Taoist production. (French by Rémusat, Klaproth, and Julien, 1816, 1828, and 1830; English in the "Canton Register," 1830.)—In poetry and polite literature, the writings of the Chinese are very voluminous. Their poems are most frequently descriptive of nature and natural scenery, domestic life, or the cares of the world. Martial odes are not infrequent. Epic poetry is almost unknown in China; but we find occasional details of historical events. Somewhat singularly, the *Tsoo sze*, or "Elegies of Tsoo," form a class by themselves. These are a series of plaintive poems mainly written by K'eüeh Yuen, a minister of the kingdom of Tsoo and relative of the prince. Distinguished by probity of character, he was the victim of slander by his envious colleagues, and ended his existence by throwing himself into a river. His fate is still commemorated in the dragon boat festival. His principal piece, *Le saou*, is a justification of his public character. (German by Pfizmaier, Vienna, 1852; French by Saint-Denys, Paris, 1870.) A good many commentaries have been written on the collection. One of the best editions of the leading piece is the *Le saou keae*, published in 1741, by Koo Ching-t'eën, with an original exposition.—Another class is termed "Individual Collections," containing the original productions of single authors. Writings of the kind made their appearance at an early period in the Christian era, consisting generally of post-mortem compilations. In the 6th century these began to be divided into several sections according to time or subject. This has been a most prolific class, but one in which comparatively few authors find a place in the ranks of fame. In the bibliographical catalogues of the Sung dynasty there are not found a tenth part of the names of authors in this class contained in those of the Suy and Tang dynasties; and the catalogues of the present day scarcely contain a tenth part of the titles of those recorded as extant during the Sung. Among the most famous is found *Le t'ae p'ih tseïh*, the productions of Le Tae-pih, the renowned poet of the Tang dynasty; also *Tung p'o tseuen tseïh*, in 115 books, from the pen of the scarcely less celebrated Soo Tung-po, the Sung poet. Both these have been frequently republished with commentaries. The writings of Lü Kew-yuen, a contemporary and friend of the renowned Choo He, were arranged by his son, and edited by his pupil Yuen Sëe in the 13th century, with the title *Seang shan tseïh*, in 28 books. This holds a prominent place among the elegant writers of the Sung dynasty, and consists of letters, memorials to

the throne, records, prefaces and dedications, miscellaneous pieces, poems, sacrificial documents, epitaphs, and sepulchral inscriptions. The emperors of the present dynasty have distinguished themselves in this class more than in any other; and we have a bulky series from the different monarchs. Thus there is a literary collection of 176 books, besides another of poems in 28 books, by the second emperor of the line. His successor has left a collection in 30 books, and the fourth monarch has left collections to the amount of 166 books. Single poems should also come within this category, such as the *Hwa tseu ke*, a love tale written in metrical stanzas. (English by Thoms, "Chinese Courtship," London, 1824.)—In the 6th century a new class of works appeared, which may be termed anthologies. The first of these was compiled about 530, by the son of the founder of the Leang dynasty. It is named *Wän seuw*, and is still one of the best known, the contents being selections from all preceding writers of fame. The subjects into which it is divided are anomalous verse, poems, elegies, sevens verse, decrees, appointments, orders, instructions, essays, manifestations, statements, declarations, accusations, documents, memorials, epistles, notifications, replies, rejoinders, farewells, prefaces, eulogiums, commendations, contracts, historical relations, commendatory historical narrations, discourses, literary gems, admonitions, monumental legends, obituaries, laments, inscriptions, epitaphs, memoirs, dirges, and sacrificial orations. A notable work of this kind, with the title *Koo wän yuen keen*, in 64 books, was published by imperial commission in 1685. It gives an uninterrupted succession of choice literary selections, from the time of the *Tao chuen* down to the end of the Sung dynasty. The annotations of five eminent scholars are appended. A huge compilation of the poetry of the Tang dynasty, under the title *Tseuen t'ang she*, in 900 books, was issued in 1703, by imperial commission. Upward of 2,200 people were employed in making the collection, which they gathered from private histories, miscellaneous works, monumental records, and every available source, making altogether 48,900 pieces. The writings of Le T'ae-pih and T'oo Foo hold a prominent place in the collection. In the 4th or 5th century, when poetry and composition began to be more under the restraints of fixed and conventional laws, critiques on poetry and literature first made an appearance; and to this class we are indebted for a fund of information on the history, changes, internal mechanism, and chief aim of this much cultivated branch of art. As an example of these works may be noticed the *She hëo yuen ke huö fä ta ching*, in 18 books, by Yu Seang, issued in 1697. The various objects of the themes of poetry are detailed in the order of a cyclopædia. The theme is first explained, then its various applications, followed by quotations from the poets, the ideas embodied, and the application in the successive

parts of a poem. This is followed by a kind of rhyming dictionary, in which a number of quotations are given under each rhyme, and notes for the artistic management of the same.—In the last class are placed the "Rhymes and Songs." The *tsze*, or rhyme, is a composition between prose and poetry, in which the rhyme is repeated at the end of lines of indeterminate length, unfettered by the laws of versification. It first began to be used in the Tang dynasty, but is much more common in recent times, being generally applied to light and trivial subjects. A large work of this class is the *Yu ting leih tae she yu*, in 100 books, published by imperial commission in 1707. This is a comprehensive collection of the choicest rhymes, from the commencement of the art in the Tang dynasty down to the end of the Ming, comprising 1,540 articles, making upward of 9,000 verses. A list of rhymers is included. The *k'ëuh*, or songs, embrace dramatic compositions, these being in great part choral effusions. These are barely acknowledged by literary men as forming a part of the literature of the nation, although they are to be found in every book store. A much valued work of the kind is the *Yuen jin pih chung k'ëuh*, or "Hundred Plays of the Yuen Dynasty," being a selection from the productions of more than 200 dramatists who wrote about that period. As a dramatic composition the *Se seang ke*, or "Record of the Western Pavilion," holds the highest place in native estimation; and next to it ranks the *Pe-pa-ke*, or "Tale of a Guitar." A well known collection of recent date is entitled the *Chuy pih k'ew*, numbering several tens of dramatic pieces.—It has long been the custom in China to publish large collections of separate works, under the name of *Ts'ung shoo*, sometimes confined to specialties, but very often ranging over the whole field of literature, and containing some choice or rare treatises in each department, according to the compiler's taste or fancy. These may consist of few or many volumes, some collections extending to hundreds. By this means many works are preserved, which would otherwise probably be lost sight of altogether. As an example of these, the *Han wei ts'ung shoo* is a collection of 96 works written during the Han and Wei dynasties, and republished in the Ming dynasty by Ch'ing Yung in the above form. IV. PRINTING. There is reason to believe that printing by wooden blocks was known to the Chinese in the 6th century, though we scarcely hear anything of its application for four centuries later, till the advantages of the art became so manifest that we are told that in 932 Fung Taou and Le Yu, two ministers of the Later Han, memorialized the throne to have the "Nine Classics" revised and printed. The monarch complied, and in about 20 years the copies were in circulation. From that time, so rapidly did this stereotypography advance, that by the end of the 13th century the greater part of the manuscript literature of former ages

was already in print. Some few specimens of the Sung dynasty typography are still to be found in libraries, but they are very rare. The mounted manuscript rolls seem to have been immediately succeeded by long strips, printed on one side, and doubled up in a succession of folds to a book size. This practice is still continued for the sacred books of the Buddhists. The next step in advance was the folded sheets stitched together in volumes, as is the practice at the present day. In the 11th century a scheme for printing by movable clay type was invented by a mechanic named Peih Shing; we have a minute detail of the process, but there is no account of its having been brought into use; and it is not till the 17th century that we hear of movable type being actually employed in printing. A font of copper types was then made in the imperial printing office, and the *Koo kin t'oo shoo tseih ching*, a gigantic collection of books in 6,000 volumes, was printed with them. The types, however, having fallen out of use, a large proportion of them were purloined by untrustworthy officials, and the remainder melted up to conceal the fraud. In the following century a set of wooden types was made in the same establishment, for the purpose of printing another collection, the *Sze koo tseuen shoo*, noticed above, the printed catalogue of which contains about 3,440 separate works, comprising upward of 78,000 books or sections. The use of these types, however, has been very limited. At present the "Peking Gazette," the daily official organ of the government, is printed with movable wooden type; but both the type and the manipulation are of the clumsiest order, and the impression is one of the rudest specimens of typography that can be found. The printing press has not yet been introduced there. Some private firms have used movable copper types for printing for nearly a century past, and in 1850 we are told of a bookseller in Canton who had cast 150,000 tin types from clay matrices. The specimen of them given in the "Chinese Repository" is very creditable to the artist. About 40 years ago the Rev. Samuel Dyer, of the London missionary society, initiated the use of movable type for China according to the European method. The same work was carried on to perfection by Mr. Cole, and subsequently by Mr. Gamble of the American Presbyterian mission; and so great has been the success of the latter, that not only are his types used by several European firms, but a considerable number of Chinese have also commenced printing with movable types after the western fashion. Some of the natives have also commenced type founding, and even the making of electrotypes. Books are thus being printed and newspapers put into circulation, and it is difficult to foretell what may be the result of this new impetus. V. SINOLOGY. The study of the Chinese language and literature in Europe is almost entirely a growth of the present century, previous to

which very few besides the Roman Catholic missionaries had any knowledge of the subject. The first grammar we hear of was printed at Canton in 1703, in the Mandarin dialect, with the title *Arte de la lengua mandarina*, by Father Francis Varo. Bayer published his *Museum Sinicum* in 2 vols. at St. Petersburg in 1730. This contains a short Mandarin grammar, and another of the dialect of Chinchow in Fokien; also a Chinese vocabulary. Fourmont in France was engaged on kindred studies, and in 1742 published his *Linguae Sinarum Mandarinicae Hieroglyphica Grammatica duplex*, which proves to be a slightly modified translation of Varo's grammar. Five years later he published his dissertation on the written language, *Meditationes Sinicae*, a work full of errors. Little else of a philological character appeared in the last century, and any slight interest that might have been created seemed to be on the decline, when Rémusat was appointed professor of the Chinese language in Paris in 1815. The lectures and writings of this distinguished sinologue began to draw the attention of Europeans to China as a great fact, and to invest the literature of the nation with a new interest. His successor, M. Julien, has fully sustained the reputation of the chair. The following are the principal works of a philological character that have appeared: DICTIONARIES. 1. *In Latin. Dictionnaire françois et latin*, composed by Father Basil de Glemona and edited by De Guignes (Paris, 1813). The first part of a supplement to this, by Klaproth, was issued in 1819, containing scarcely a quarter of the whole, but no more was published. De Guignes's was republished at Hong Kong in 1853, without the French, as *Dictionarium Sinico-Latinum*. Gonçalves, *Vocabularium Latino-Sinicum* (Macao, 1836), *Lexicon Manuale Latino-Sinicum* (1839), and *Lexicon Magnum Latino-Sinicum* (1841). Callery, *Systema Phonetico-scripturae Sinicae* (Macao, 1841), arranged on a peculiar phonetic system of his own device. Perny, *Vocabularium Latino-Sinicum* (China, 1861). 2. *Portuguese. Gonçalves, Dicionario Portuguez-China* (Macao, 1831), and *Diccionario China-Portuguez* (1833). 3. *French. Perny, Dictionnaire françois-latin-chinois de la langue mandarine parlée* (Paris, 1869), with an appendix as large (1872). 4. *Russian. Grafitcheskaya sistema kitaiskikh ieroglyfov* (St. Petersburg, 1867); Esaiya, *Rusko-kitaiski slovar* (Peking, 1867), and *Predovlenie k' rusko-kitaiskomu slovariu* (1870). 5. *English. Morrison, "Dictionary of the Chinese Language"* (6 vols. 4to, Macao, 1815-'23); 2d part, "Alphabetic Chinese and English" (republished at Shanghai, 2 vols. 8vo, 1865); "Vocabulary of the Canton Dialect" (Macao, 1828); Medhurst, "Chinese and English Dictionary" (Batavia, 1842-'3), and "English and Chinese Dictionary" (Shanghai, 1847-'8); Lobscheid, "English and Chinese Dictionary" (4 vols., Hong Kong, 1869), and "A Chinese and English Dictionary"

(1871); Doolittle, "Vocabulary and Handbook of the Chinese Language" (2 vols. 4to, Foochow and Shanghai, 1872-'3); Kwong Tsūn-fuh, "English and Chinese Lexicon" (Hong Kong, 1868); Williams, "English and Chinese Vocabulary, in the Court Dialect" (Macao, 1844), and "Tonic Dictionary of the Chinese Language, in the Canton Dialect" (Canton, 1856); Chalmers, "English and Cantonese Pocket Dictionary" (Hong Kong, 1859); Stent, "Chinese and English Vocabulary, in the Pekinese Dialect" (Shanghai, 1871); Medhurst, "Dictionary of the Hokkēen Dialect" (Macao, 1832); Maclay and Baldwin, "Alphabetic Dictionary of the Chinese Language, in the Foochow Dialect" (Foochow, 1870).—GRAMMARS. 1. *Latin*. Premare, *Notitia Linguae Sinicae* (Malacca, 1831). 2. *Portuguese*. Gonçalves, *Arte China* (Macao, 1829). 3. *French*. Rémusat, *Éléments de la grammaire chinoise* (Paris, 1822); this has been republished, edited by De Rosny; Bazin, *Mémoire sur les principes généraux du chinois vulgaire* (Paris, 1845), and *Grammaire mandarine* (1856); Rochet, *Manuel pratique de la langue chinoise vulgaire* (Paris, 1846); Julien, *Syntaxe nouvelle de la langue chinoise* (Paris, 1869-'70). 4. *German*. Endlicher, *Anfangsgründe der chinesischen Grammatik* (Vienna, 1845); Schott, *Chinesische Sprachlehre* (Berlin, 1857). 5. *Russian*. Hyakinth, *Kitaiskaya grammatika* (St. Petersburg, 1838). 6. *English*. Marshman, *Clavis Sinica* (Serampore, 1814); Morrison, "A Grammar of the Chinese Language" (Serampore, 1816); Gützlaff, "Notices on Chinese Grammar" (Batavia, 1842); J. G. Bridgman, "The *Notitia Linguae Sinicae* of Premare, translated into English" (Canton, 1847); Summers, "Handbook of the Chinese Language" (Oxford, 1863), and "The Rudiments of the Chinese Language" (London, 1864); Lobscheid, "Grammar of the Chinese Language" (Hong Kong, 1864); Edkins, "A Grammar of Colloquial Chinese, as exhibited in the Shanghai Dialect" (Shanghai, 1853; 2d ed., 1868), and "A Grammar of the Chinese Colloquial Language, commonly called the Mandarin Dialect" (1857; 2d ed., 1864); Baldwin, "Manual of the Foochow Dialect" (Foochow, 1871).—Among the phrase books and manuals we may notice Morrison's "Dialogues and Detached Sentences in the Chinese Language" (Macao, 1816); Shaou-tih's "English and Chinese Student's Assistant" (Malacca, 1826); Legge's "Lexilogus of the English, Malay, and Chinese Languages" (Malacca, 1841); Bridgman's "Chinese Chrestomathy in the Canton Dialect" (Macao, 1841); Williams's "Easy Lessons in Chinese" (Macao, 1842); Medhurst's "Chinese Dialogues" (Shanghai, 1844; revised ed. by his son, 1863); Edkins's "Chinese Conversations" (Shanghai, 1852); "Doty's Anglo-Chinese Manual, with Romanized Colloquial in the Amoy Dialect" (Canton, 1853); Hernisz's "Guide to Conversation in English and Chinese" (Boston, 1854); Lob-

scheid's "Beginner's First Book, or Vocabulary of the Canton Dialect" (Hong Kong, 1858); Wade's "*Hsin-ching-lu*, or Book of Experiments" (Hong Kong, 1859); Macgowan's "Collection of Phrases in the Shanghai Dialect" (Shanghai, 1862); Thoms's "The Chinese Speaker" (Ningpo, 1846); Edkins's "Progressive Lessons in the Chinese Spoken Language" (Shanghai, 1862); Martin's "The Analytical Reader" (Shanghai, 1863); Lobscheid's "Select Phrases and Reading Lessons in the Canton Dialect," and "Tourist's Guide and Merchant's Manual" (Hong Kong, 1864); Rubery's "Easy Phrases in the Canton Dialect" (Canton, 1866); Lobscheid's "Household Companion and Student's First Assistant" (Hong Kong, 1867); Wade's "*Yü-yen Teü-erh Chi*, a Progressive Course designed to assist the Student of Colloquial Chinese," and "*Wên-chien Tzü-erh Chi*, a Series of Papers selected as Specimens of Documentary Chinese" (London, 1867); Macgowan's "A Manual of the Amoy Colloquial" (Hong Kong, 1869); and Wylie's "Notes on Chinese Literature" (Shanghai, 1867).

CHINANDEGA, a town in the Occidental department of Nicaragua, situated on the plain of Leon, about 6 m. from Realejo on the Pacific, which is its seaport; pop. about 15,000. It lies in the midst of a district of extraordinary fertility and agricultural resources, which, however, are but poorly developed. It consists of two contiguous towns, Old and New Chinandega, and is almost the only place in Nicaragua that has grown since the separation from Spain; a considerable part of the inhabitants of Leon, tired of the turmoils and dangers of the political capital, having sought here comparative quiet and security. Many of the houses, which are straggling and devoid of architectural taste, are surrounded by gardens and plantations. During the existence of the first Central American confederacy, the congress met at Chinandega.

CHINA SEA (Chinese, *Nan-hai*, Southern sea), that portion of the Pacific cut off from the main ocean by a chain of islands, of which Borneo, the Philippines, and Formosa are the principal. It is bounded E. by this chain of islands, and W. by China, Anam, and the Malay peninsula. On the N. it opens into the Tang-hai, or Eastern sea, through the Formosa channel; on the E. into the Pacific through the Balintang channel, between the islands of Formosa and Luzon; on the S. into the Indian ocean through the sea and strait of Sunda; on the S. W. into the sea of Bengal through the strait of Malacca. Its extreme length, S. W. to N. E., from the extremity of the Malay peninsula to Formosa, is about 2,000 m.; average breadth, W. to E., from the continent of Asia to the chain of islands, about 750 m. It has two deep indentations: the gulf of Tonquin, between China and Anam; and the gulf of Siam, between Siam and the Malay peninsula. The islands are few, Hainan being the only one of considerable size.

The Canton, Mekong, and Menan are the principal rivers which fall into it. Canton, Manila, and Singapore are the most important ports on its coasts.

CHINA WARE. See PORCELAIN.

CHINCHA ISLANDS, a group of three small islets off the coast of Peru, celebrated for their

deposits of guano, from which the Peruvian government derives a revenue larger than from all other sources combined. They lie about 12 m. from the port of Pisco, in the department of Lima, in lat. $13^{\circ} 44' S.$, lon. $76^{\circ} 13' W.$ They are of granitic formation, the rock being of a bright red color, composed of red



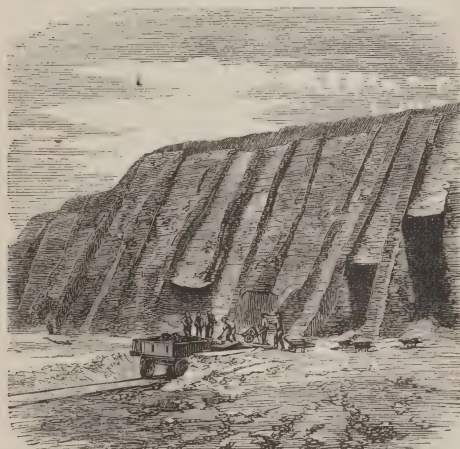
Chincha Islands.

feldspar, white quartz, and a little mica, and are evidently the result of volcanic upheavals. The shores are bold and precipitous, rising usually 25 or 30 ft. above the sea, but in some places much higher, and increasing in height toward the centre. The cliffs are perforated with caves and arches, the homes of multitudes of penguins and other aquatic fowl; and the guano is honeycombed with the nests of small birds, which frequent the islands in immense flocks. The surface, which is destitute of vege-

northern island, and chief of the group, is about four fifths of a mile in length and one third in breadth. It has been estimated to contain 17,000,000 tons of guano, and the others about 25,000,000; but these figures are probably exaggerated. About one half of the deposit of this island has already been excavated. (See GUANO.)

CHINCHAYCOCHA, a lake of Peru, in the department of Junin, about 10 m. S. S. E. of Pasco. Its N. W. extremity is in lat. $10^{\circ} 42' S.$, lon. $75^{\circ} 40' W.$ It is 13,000 ft. above the sea, and is 35 m. in length and 7 in width. With the exception of Lakes Titicaca and Maracaibo, it is the largest sheet of fresh water in South America. The principal branch of the Mantaro or Jauja, one of the largest tributaries of the Ucayali, issues from it. As it loses by this and other outlets more water than it receives from streams flowing into it, it is undoubtedly fed by subterraneous springs. Its banks are marshy and are frequented by many water fowl. Its S. W. extremity is crossed by a marshy piece of ground, called the Calzada, which forms a means of communication between the two shores.

CHINCH BUG, a small hemipterous insect (*rhyparochromus devastator*, Say), which occasionally commits great depredations in wheat and corn fields, especially in the southern and western states. It is about $\frac{3}{10}$ of an inch long, with



Guano Workings in the North Island.

tation, is covered with guano more than 100 ft. in depth. The excavating and shipping of this deposit employs 200 or 300 laborers, mostly convicts and Chinese coolies, who have formed a temporary settlement on the principal island. They live in huts of bulrush matting, stretched on bamboo supports, which furnish a sufficient shelter in this dry climate. All means of subsistence, even drinking water, have to be brought from the mainland. More than 100 vessels are usually lying here, loading or waiting for cargoes. Chincha, the



Chinch Bug (*Rhyparochromus devastator*).

white wing covers, upon each of which is a short central line and a large marginal oval spot of black; the rest of the body is black and downy; the beak, legs, base of antennae, and

hinder edge of thorax, reddish yellow; and fore part of the thorax grayish. The young are wingless, at first bright red, changing gradually to the colors of the adult. The eggs are laid in the ground, and the young appear on the wheat about the middle of June, and may be seen on grains and grasses all summer.

CHINCHILLA, a little animal of the family *chinchillidæ* and order *rodentia*. The family is defined by Mr. Bennett, to whom the world owes most of what is known concerning this species, as follows: The incisors are $\frac{2}{3}$, simple; molars $\frac{4-4}{4}$, consisting of 2 or 3 tænia or ribbon-like lamellæ or plates, parallel with each other, entirely surrounded by a vitreous substance; the crowns exactly opposite to each other, and flattened by attrition. The posterior limbs are nearly twice as long as the anterior. The tail, produced, has long and bristly hairs about the tip and on the upper side. Anterior feet five-toed; posterior feet four-toed, the nails small and subfalcar; the tail rather long. This is the well known fur-bearing chinchilla, the skins of which are so much used



Chinchilla lanigera.

in the winter dress of ladies. The *chinchillidæ* are gregarious and subterranean in their habits, and mild in their disposition. Mr. Waterhouse, in his "Natural History of Mammalia," makes the *chinchillidæ* a sub-family of the family *hystrioidæ*. There are two species of this genus, *C. lanigera* and *C. brevicaudata* (Waterhouse); the former, to which the following remarks particularly apply, peculiar to Chili; the latter, somewhat larger, coarser, and less known, to Peru. The length of the body of this beautiful little creature is 9 inches, and that of the tail nearly 5. Its proportions are close set, and its limbs rather short, the posterior being considerably longer than the anterior. The fur is long, thick, close, woolly, somewhat crisped and entangled together, grayish or ash-colored above and paler beneath. The form of the head resembles that of the rabbit; the eyes are full, large, and black, and the ears broad, naked, rounded at the tips, and nearly as long as the head. The mustaches are plentiful and very long, the longest being twice the length of the head, some of them black, others white. The tail is about half the length of the body, of equal thickness throughout, and

covered with long bushy hairs; it is usually kept turned upward toward the back, but not reverted as in the squirrels. Mr. Yarrell, who dissected one that died in the menagerie of the zoological society in London, has given the best account of it in the "Proceedings" of the society; and while he points out that in the possession of an extra toe on each of the feet it requires the generic distinction claimed for it by Mr. Bennett and Dr. Gray, he adds that the resemblance of the skeleton to that of the jerboa is also remarkable, particularly in the form of the head, the excessive development of the auditory cavities, and the small size of the anterior extremities compared with the hind legs. Although an extensive trade has been carried on in the skins of this interesting little animal, it is only within a few years that it has been seen alive in this country. Molina says: "It lives in burrows underground, in the open country of the northern part of Chili, and is very fond of being in company with others of its species. It feeds upon the roots of various bulbous plants which grow abundantly in those parts, and produces twice a year five or six young ones. It is so docile and mild in temper that, if taken into the hands, it neither bites nor tries to escape, but seems to take pleasure in being caressed." Mr. Bennett says: "To the account of its habits given by Molina, we can only add that it usually sits on its haunches, and is even able to raise itself up and stand upon its hinder feet. It feeds in a sitting posture, grasping its food and conveying it to its mouth by means of its fore paws." It breeds freely in confinement.

CHINCHILLA, a city of Spain, in the province and 10 m. S. E. of the city of Albacete; pop. about 12,500. It stands on an abrupt hill, and is surrounded by a wall built in 1837 out of remains of older ones. It contains a handsome parish church, several chapels and convents, a prison, hospital, theatre, cemetery, poorhouse, barracks, and Latin and primary schools. There are various manufactures, and trade in cotton, wool, grain, and fruits. Quarries of granite, alabaster, gypsum, and limestone are wrought in the vicinity. The railroad from Madrid to Valencia passes about 3 m. from the city.

CHINGLEPUT, an inland town of British India, in the Carnatic, presidency of Madras, capital of an extensive district, 35 m. S. S. W. of Madras; pop. about 7,500. It consists of one long street, and adjoins another town or collection of dwellings called Nullam. An artificial lake or tank and a feeder of the Palar river supply the place with water, and the climate is salubrious excepting during the dry season, when the decayed matter in the tank produces malaria. Rice is the principal article of trade, and pottery is manufactured. The fort, once of considerable strength, is divided into two parts by a rampart and a ditch, the E. part being elevated and constituting an inner fort, with the government buildings of the district.

The fort was taken by the French in 1751, and retaken by the English under Clive in 1752.

CHIN-INDIA, sometimes called India beyond the Ganges, and also Indo-China, the peninsula lying between the China sea and the sea of Bengal, comprising Burmah, Siam, Anam, and the Malay peninsula.

CHING-KING, a Chinese province. See SHING-KING.

CHINON, a town of France, in the department of Indre-et-Loire, 25 m. S. W. of Tours; pop. in 1866, 6,895. It is pleasantly situated on the right bank of the Vienne. The principal public buildings are the town hall and the communal college. Henry II. of England died there, and near it Rabelais was born. It was the favorite residence of the French monarchs from Philip Augustus to Henry IV. The ruins of the castle where Charles VII. resided when Paris was occupied by the English, and where Joan of Arc presented herself to that monarch, are still seen. The principal articles of trade are grain, wine, prunes (called prunes of Tours), and other dried and fresh fruits.

CHINOOKS, a family of Indian tribes on the N. W. coast of North America, who formerly inhabited both banks of the Columbia river from its mouth to the Grand Dalles, broken up into numerous bands. The Chinooks proper were on the north side, and the Clatsops on the south and along the coast. The language varied as the tribes extended into the interior. In all its dialects it is very complicated and difficult to pronounce. This led to the composition of the Chinook jargon, a sort of *lingua franca* used by the traders, containing some Chinook words with terms from the French, English, and many Indian languages, all corrupted into a new form. The Chinook Indians are now nearly extinct, a small band on the Chehalis reservation in Washington territory representing them in 1873. A vocabulary of their language, by George Gibbs, was published at New York in 1863; and a "Dictionary of the Chinook Jargon," thoroughly analyzed by the same scholar, in the same year.

CHINSOORA, or *Chinsura*, a town of Bengal, British India, on the right bank of the Hoogly, 20 m. above Calcutta; lat. 22° 53' N., lon. 88° 23' E.; pop. about 14,000. It extends about half a mile along the river, is neatly and solidly built, and is an important station for European troops. The barracks, hospital, and other buildings connected with the military establishment are on a magnificent scale, and since 1858 have been greatly enlarged. The barracks are intended to accommodate 5,000 men. Besides the Hoogly college, a government institution, the town has several schools and a chapel. It is famous for the manufacture of cheroots. It was settled by the Dutch in 1657, and in its small, quaint-looking dwellings bears many traces of its founders. In 1759 the British under Col. Forde defeated near here a Dutch force which had attempted to check their march on Chandernagore. When Hol-

land was occupied by the French in 1795, the British offered to retain Chinsoorra for the stadtholder; but their proposition being rejected, they took it by force, and retained possession till the peace of 1814. It formed part of the territory ceded to the British by the king of the Netherlands in 1824, in exchange for possessions in Sumatra.

CHIOGGIA, or *Chiozza* (anc. *Fossa Clodia*, and *Clugia*), a seaport of Italy, in the province of Udine, on the Adriatic, 15 m. S. of Venice; pop. in 1872, 26,336. It is situated on a small island at the S. end of the lagoon of Venice, a little N. of the embouchure of the Brenta, is built partly on piles, and communicates with the mainland by a low stone bridge of 43 arches. The harbor, which has 17 feet of water, is considered one of the best fortified in the vicinity of Venice, being defended by a number of batteries and the forts of Caraman and San Felice. It is usually crowded with fishing and coasting vessels, in which a large part of the population find employment. It is a bishop's see, and contains several churches, a gymnasium, a high seminary, orphan asylum, hospital, workhouse, theatre, custom house, ship yards, salt works, and manufactories of lace, cordage, and other articles. It is the centre of an active trade in Italian and German products, which is facilitated by canals communicating with the Brenta, Adige, and Po. Titian is said to have found models for some of his finest works in the women of Chioggia, who have long been noted for beauty; and Léopold Robert and other modern painters have often resorted for inspiration to the same source. In 1379 the Genoese took possession of the island, but after a struggle of two years, to which the name of the war of Chioggia has been given, were forced to yield it to Venice.

CHIOS. See SCIO.

CHIPMAN. **I. Nathaniel**, LL. D., an American jurist, born at Salisbury, Conn., Nov. 15, 1752, died at Middlebury, Vt., Feb. 15, 1843. He was educated at Yale college, during his senior year obtained a lieutenant's commission in the American army, was on duty at Valley Forge in the winter of 1777-'8, and was present at the battle of Monmouth. Resigning his commission, Oct. 10, 1778, he repaired to Litchfield, Conn., and was admitted to the bar in 1779. He then removed to Tinmouth, Vt., where he commenced practice, and served as state's attorney for four years. In 1786 he was elected assistant judge of the supreme court, being the first lawyer who had been placed upon the bench in Vermont. In 1789 he was elected chief justice, and was appointed one of the commissioners to adjust the differences between Vermont and New York. In 1791 he was a member of the convention called to decide whether Vermont should join the Union, and he was appointed a joint commissioner with Lewis R. Morris to attend congress and negotiate for the admission of the state. In the same year he was appointed by Wash-

ington judge of the United States court for the district of Vermont. In 1793 he published a small work entitled "Sketches of the Principles of Government," and a volume of "Reports and Dissertations," containing reports of cases decided while he was chief justice, with dissertations on the statute adopting the common law of England, the statute of offsets on negotiable notes, and the statute of conveyances. He resigned his office in 1793, and resumed practice till October, 1796, when he was again elected chief justice of the state supreme court. In 1796 he was appointed one of a committee to revise a code of statute laws for Vermont. The revised laws of 1797 were written by him. In 1797 he was elected a senator in congress. In 1813 he was chosen one of the council of censors to examine the state constitution and to propose amendments. In the same year he was again elected chief justice of the supreme court, and continued in office two years. From 1816 to 1843 he was professor of law in Middlebury college. In 1833 he published "Principles of Government; a Treatise on Free Institutions, including the Constitution of the United States," containing portions of his former treatise. **II. Daniel, LL. D.,** an American jurist, brother of the preceding, born at Salisbury, Conn., in 1762, died at Rip-ton, Vt., April 23, 1850. He was educated at Dartmouth college, was admitted to the bar at Middlebury, Vt., in 1790, and there practised law for many years. He was state's attorney for Addison county for eight years subsequent to 1797, for a long period represented Middlebury in the legislature, and was a member of congress in 1815-'17. He was professor of law and jurisprudence in Middlebury college from 1806 to 1816, when he was succeeded by his brother Nathaniel. He was the first official reporter of the decisions of the supreme court of Vermont, and in 1824-'5 published two volumes of reports. In 1822 he published "An Essay on the Law of Contracts for the Payment of Specific Articles;" in 1849, memoirs of Col. Seth Warner and Gov. Thomas Chittenden; and in 1846, a biography of Nathaniel Chipman.

CHIPMUNK, the name usually given to the ground squirrel (*tamias*, Illig). The ground squirrels have cheek pouches extending to the hind head and opening internally; the tail is shorter than the body, the feet large, with well developed claws for digging, and the anterior basal plate of the zygoma perforated by a nearly circular foramen; the permanent upper molars are four; the tail is not bushy, and there are three to five longitudinal stripes on the back. They burrow in the ground near the roots of trees, and their nest is well supplied with winter food. They form a connecting link between the squirrels proper and the spermophiles or prairie squirrels. The common American ground, striped, or cheeping squirrel, chipmunk, or hackee (*T. striatus*), has the body 5 to 6 in. long, and the tail about $4\frac{1}{2}$;

on the back and sides are five longitudinal black stripes, not extending over the rump, the outer two on each side separated only by a white line; rump pale chestnut, and the upper parts generally finely grizzled yellowish gray and brown; lids and under parts white, and a downy white spot behind the ears. It varies but little, and is found from Canada and Lake Superior to Virginia and Missouri. It is lively, playful, and busy, and may be said to occupy among mammals the place of the wren among birds; it is very commonly seen running along the fences and walls in New England, cheeping like a young chicken, the cheek pouches distended with nuts or seeds, occasionally stopping and standing upright, watching against enemies, and disappearing in some hole at the least alarm. The young are born in May, four or five at a birth. They are scarcely injurious to the farmer, not disturbing the grain before it is ripe, and only gleaning after the harvest; they feed chiefly on nuts, wheat, buckwheat, Indian corn, cherry stones, and grass seeds, with which their winter burrows are plenti-



Chipmunk.

fully supplied. They are easily captured in traps, but are not readily tamed, and are rarely seen in cages. Their worst enemy is the weasel, which pursues them into their burrows. The Missouri chipmunk (*T. quadrivittatus*) is smaller, with the intervals between the stripes all grayish white; beneath it is dirty grayish white, and the general color is more ferruginous; it most resembles the *T. Pallasi* of N. Asia and Siberia, and occurs about and west of the Rocky mountains. Other species are found on the Pacific coast.

CHIPPENHAM, a municipal and parliamentary borough of Wiltshire, England, on the left bank of the Avon, crossed here by a bridge of 22 arches, 12 m. N. E. of Bath; pop. in 1871, 8,282. It is a handsome town, with an ancient Gothic parish church. Schools are numerous, and there are several charitable institutions. Tanning and malting are carried on, and there are extensive iron works. Silk and wool are manufactured to some extent, but the latter industry has much declined. Mineral springs are in the vicinity.

CHIPPEWA, a river of Wisconsin, called by the Indians the Ojibway, or Ojibbeway. It

ries in the N. part of the state, flows in a S. W. direction through a country mostly covered with pine forests, and after a course of over 200 m. enters the Mississippi near Lake Pepin, 85 m. below St. Paul, Minnesota. It is about 500 yards wide at its mouth.

CHIPPEWA. I. A N. E. county of Michigan, bordering on Lakes Superior and Huron, and bounded E. by the river St. Mary; area, about 1,500 sq. m.; pop. in 1870, 1,689. It includes several islands. The surface is hilly and partly covered with forests of pine. The chief productions in 1870 were 2,005 bushels of oats, 9,227 of potatoes, and 940 tons of hay. The value of live stock was \$16,278. Capital, Sault Ste. Marie. II. A N. W. county of Wisconsin, traversed by the Chippewa river and several affluents; area, about 4,000 sq. m.; pop. in 1870, 8,311. The surface is uneven, and forests of pine and other trees abound. Sandstone is common. The chief productions in 1870 were 131,505 bushels of wheat, 32,751 of Indian corn, 166,944 of oats, 67,890 of potatoes, and 8,255 tons of hay. There were 928 horses, 1,466 milch cows, 2,559 other cattle, and 2,478 swine. There were 3 flour mills, 14 saw mills, and 2 breweries. Capital, Chippewa Falls. III. A S. W. county of Minnesota, bounded S. W. by the Minnesota river, and intersected by the Chippewa and Chetomba; area, 2,445 sq. m.; pop. in 1870, 1,467. The St. Paul and Pacific railroad just touches the N. E. corner. The chief productions in 1870 were 9,318 bushels of wheat, 3,550 of Indian corn, 2,465 of oats, 4,993 tons of hay, and 64,830 lbs. of butter. There were 158 horses, 584 milch cows, 1,501 other cattle, and 256 swine. Capital, Chippewa City.

CHIPPEWA, a village and port of entry in the province of Ontario, Canada, in the township of Willoughby, Welland co.; pop. about 1,200. It is situated at the confluence of the Chippewa and Niagara rivers, 2 m. above the falls, and contains an extensive steam engine manufactory, and one of the largest factories of stoves in the province.—A battle was fought here, July 5, 1814, between the Americans under Gen. Brown and the British under Gen. Riall. On the 3d the Americans crossed the Niagara river, surprised Fort Erie, and the next day moved down the river. On the 5th they came upon the enemy, concealed behind a wood. After a series of attacks and counter-attacks, the British were finally repulsed, and retreated across Chippewa creek, burning the bridge behind them. The Americans in this action were actually commanded by Gen. Scott, Gen. Brown not being in the field. The Americans engaged numbered 1,900; their loss was 68 killed and 267 wounded. The British numbered 2,100, and lost 138 killed and 365 wounded.

CHIPPEWAS. See OJIBWAYS.

CHIPPEWIANS. See TINNE.

CHIQUMULA. I. A department of Guatemala, Central America, lying on the gulf of

Honduras, and N. and W. of the states of Honduras and San Salvador; area, about 4,000 sq. m.; pop. about 75,000. The river Motagua, which nearly bisects it, emptying into the bay of Honduras, is its principal stream. San Tomas de Castillo, at its mouth, has one of the best ports in Central America. In 1844 a Belgian colony was established here, but it failed gradually, and in 1854 Guatemala resumed its authority over the settlement, and it is now nearly deserted. Izabal, the only other port of Guatemala, is also in Chiquimula. It is on the south shore of the gulf of Dulce, and can be reached only by vessels of light draught. II. **Chiquimula de la Sierra**, the capital of the department, about 75 m. N. E. of the city of Guatemala; pop. about 6,000. It is the centre of an active trade, and maize is raised in considerable quantities in its vicinity. It has a large church and a fountain in the principal square. III. **Isthmus of**, that part of the department of Chiquimula along the Caribbean sea, extending about 70 m. from the mouth of the river Motagua to the N. W. extremity of the bay of Honduras. The distance from the Atlantic to the Pacific at this point is 150 m.

CHIQUITOS, a once powerful Indian tribe of South America, inhabiting the country west of the river Paraguay, in the present province of Chiquitos in Bolivia. They are described by Charlevoix and other early writers as an intelligent and independent race, brave and with warlike instincts, and excelling in manly exercises. They occupied the hills and elevated plateaus, lived in families, united agriculture with the chase, and, possessing large resources, were always numerous. They were first visited by Alexis Garcia, a Portuguese, who, having been sent from the coast of Brazil to explore the interior of Paraguay, about 1525, conceived the bold project of reaching Peru across the wilderness of the Gran Chaco. Gathering a force of 2,000 Indians, he went up the Paraguay above the site of Asuncion, and thence passed in a N. W. direction through the S. portion of Chiquitos, fighting his way through the thickly populated country until he reached the Andes, where he was murdered by his Indian allies. In 1537 Juan de Ayolas perished in conducting a similar expedition. Other adventurers failed in bringing to subjection this brave people, and it was not till 1691 that a permanent settlement was made among them. In that year Father Arce, a Jesuit, established the mission of San Xavier, and from that time till their expulsion the Jesuits retained an unbounded influence over the natives. Other missions soon followed. In 1696 San Rafael was built; in 1706, San José and San Juan; in 1707, Concepcion and San Ignacio; and soon afterward Santa Anna and San Miguel. Santiago was founded in 1740, and San Corazon in 1751. Occupying a comparatively isolated position, these missions enjoyed a peaceful and harmonious existence. Under the instruction of the fathers the Indians acquired many industrial arts, cul-

tivated the fields, established manufactories, and carried on a remunerative trade with the neighboring Spanish settlements. D'Orbigny and other writers assert that these towns were in advance of those of the Spaniards, that their manufactures were better, and the produce of their lands superior and more abundant. Their churches and mission buildings rivalled any in the new world, and were remarkable for the costliness of their decorations. Music and singing were taught, and the church choirs were composed of natives, who attained a rare degree of excellence in the art. Thus, in 50 years after the arrival of the fathers, the Chiquitos and the neighboring tribes had become moulded into a civilized race. One of the most wonderful changes effected was in the language. Until the latter part of the 17th century, so slight was the intercourse between the tribes that 13 different languages were spoken, of which the Chiquito was the most general. The Jesuits proceeded to supplant the others, with the object of making the latter the language of all the Indians settled in the missions. Chiquito Indians were sent among the surrounding tribes as instructors, prayers and services were read in that tongue only, and all business transactions were conducted in it. These efforts gradually became successful, and now none but the Chiquito tongue is used by the Indians of the province. At the time of the expulsion of the Jesuits, in 1767, the missions had acquired an extraordinary degree of prosperity; but with the withdrawal of the fostering care which the fathers had always exercised over their converts, and the bad administration of the government, they began to decline. Many of the Indians fled to the forests and relapsed into the rude ways of their fathers; the thriving villages decreased in population, and the splendid buildings and churches of the missions fell into decay. In the beginning of the present century, 34 years after the decree of expulsion, more than two thirds of the original inhabitants had disappeared; and the population is estimated now at only about 25,000.

CHIQUITOS, a province of Bolivia, in the department of Santa Cruz de la Sierra, between lat. 14° and 21° S., and lon. 57° 30' and 62° 30' W., bounded E. by the Paraguay river, N. by marshes and immense forests lying between it and the country of the Moxos, W. by the province of Santa Cruz, and S. by the Gran Chaco; area, 108,000 sq. m.; pop. about 28,000. It forms the middle part of a great plain extending N. and S. at the eastern base of the Andes, from which rises a mountain system, composed of several chains of hills, which divides the waters flowing into the Amazon from those which feed the Plata. The rivers belonging to the former are the San Miguel, Serre, Rio Verde, Baures, and Barbados, tributaries of the Guaporé. On the other side of the mountains, the Tucabaca, San Rafael, Latiriquiqui, and San Tomas all flow into the Paraguay.

The country abounds in marshes and fresh-water lakes; but the largest bodies of water are the salinas of San José and Santiago, which yield excellent salt. The climate is warm, but not so hot as its position would indicate, and is generally healthy, intermittent fevers not prevailing to any extent. The soil is rich, yet little cultivated, there being no markets for produce. Cotton, sugar, and tamarinds, however, are exported to some extent.

CHIRIQUI, a province on the isthmus and in the state of Panama, United States of Colombia, bounded N. by the Caribbean sea, S. by the Pacific, E. by the province of Veragua, and W. by Costa Rica; area, 500 sq. m.; pop. about 18,000. It is unsurpassed in diversity of surface, fertility of soil, and luxuriance of vegetation; has an abundance of land fit for pasture or tillage, contains extensive beds of good coal, and has commodious harbors, both on the Caribbean sea and the Pacific. The coast is sickly, but many districts in the interior are healthy. Its resources have been but imperfectly developed. The chief town, David, on the Pacific coast, has a population of about 3,000. The isthmus here is 46 m. wide. Its principal river, the Chiriqui, empties into the lagoon of the same name, formed by the Caribbean sea. The lagoon is a spacious bay, extending about 90 m. along the coast, and from 40 to 50 m. inland. It has three entrances, the largest of which is 2 m. wide, with an average depth of about 100 ft. It is separated from the Caribbean sea by the islands forming the archipelago of Chiriqui, 11 in number, the principal of which is Boca del Toro. There is a mountain called Chiriqui on the borders of Costa Rica, and a desert of the same name, peopled by about 5,000 savages.

CHIROMANCY (Gr. *χείρ*, hand, and *μαντεία*, divination), the pretended art of judging the character and foretelling the fortune of a person from the aspect of his hand. The elements to be observed are the thumb and fingers, nails, joints, lines, and mountains. There are 15 joints, three to each finger, two to the thumb, and one connecting the hand and arm. There are four principal lines. The line of life (*linea vitalis*), which is the most important, curves from the side of the hand between the thumb and forefinger, around the base of the thumb, to the centre of the wrist joint. The line of health (*linea naturalis*, or *cephalica*) has the same origin as the line of life, and extends directly across near the centre of the hand. The line of fortune or happiness (*linea mensalis*) is nearly parallel to the latter, and extends from near the base of the forefinger to near the base of the little finger. The line of the joint (*linea rasceta*) is the fold which marks the passage from the hand to the arm. There is a fifth line (*linea hepatica*), not found in all hands, which extends from the middle of the wrist joint to the base of the little finger. There are seven mountains (*montes*), named after the seven planets of the ancients. The elevation

at the base of the thumb is the mountain of Venus; forefinger, that of Jupiter; middle finger, that of Saturn; third or ring finger, that of the sun; little finger, that of Mercury. The elevation on the lower side of the hand, between the mountain of Mercury (from which it is separated by the line of fortune) and the lower extremity of the line of health, is the mountain of the moon; and the elevation between the mountain of the moon and the line of the joint is the mountain of Mars. Among the laws of chiromancy are the following: The observations must always be upon the person's left hand. If the line or fold of the joint presents four distinct, equal, and straight furrows, the person will speedily attain to wealth and honors; if short perpendicular lines proceed from it toward the arm, he will be exiled; if toward the palm of the hand, he will go upon a long journey. If the line of life is regular and deeply colored, it predicts a long and happy life; if it is tortuous, colorless, feebly marked, and broken, it announces ill health and short life; if it is narrow, but long and well colored, it indicates wisdom and ingenuity; if deep and unequally colored, it denotes malice; if cut near the centre by two slight but well defined transverse lines, it is the sign of approaching death. If the line of health (also called the line of wit) is clear and regular, it indicates excellence of mind and body; if the opposite, it indicates feebleness, timidity, and illness. The line of fortune, according to its various phases of distinctness and directness, indicates happiness or misery, and a pleasant or unpleasant natural temper; if it begins close to the upper side of the hand, it indicates pride; if very red in its upper part, envy; if crossed by one line so as to form the Latin cross, generosity; if by several small lines near the middle, duplicity. The line of the triangle, when present, usually promises great success after great difficulties. The mountain of Venus, when smooth and unfurrowed, indicates a happy temperament; that of Jupiter, a heart inclined to virtue; that of Saturn, simplicity of character and love of labor; that of the sun, vivacity and eloquence; that of Mercury, firmness in men and modesty in women; that of the moon, tranquillity of mind, inclining to melancholy; and that of Mars, courage and heroism. The various lines and shades of color on each of the mountains have special significance. Small lines appearing near the little finger, parallel with the line of fortune, are the *lineæ matrimoniales*, and promise a happy marriage. The milky way (*via lactea*) extends downward on the mountain of the moon from the line of the joint toward the little finger. If this is long apparent, it signifies success in study and the arts, or fortune in a foreign land. Small white spots on the nails announce happiness and the fulfilment of hopes, at a more remote period according as they are near the root of the nail.—Chiromancy was practised throughout pagan antiquity, was regarded by

Aristotle as a certain science, and was in great esteem among the disciples of Pythagoras. The augurs of Rome, and the emperor Augustus himself, practised it. During the later middle ages it was chiefly in the hands of gypsies, and was studied, like alchemy and astrology, by such philosophers as Albertus Magnus, Cardan, Roger Bacon, and Paracelsus. The church, which passed severe judgments on magical arts, tolerated chiromancy, only forbidding all alliance between it and astrology, and all interference of it with the doctrine of human liberty. A rationalistic view of chiromancy is that all actions, passions, and thoughts leave their traces on the body, and that from the conformation of the hand, its furrows, folds, colors, veins, hardness or softness, an experienced and skilful eye can determine the person's habits, social position, and the stronger tendencies of his character. The most important writers on the subject are Artemidorus (in the 2d century), Cocles (Bologna, 1504), Piccioli (Bergamo, 1578), De la Chambre (Paris, 1653-'4), Prætorius (Jena, 1661-'4), May (the Hague, 1665), Pompeji (Venice, 1680), Ingenbert (Frankfort, 1742), Peuschel (Leipsic, 1769), and especially the anonymous author of the *Grand jeu de société* (Paris, 1845), which contains an account of ancient and modern chiromancy.

CHIRON, in Greek mythology, the wisest of all the centaurs, reputed to be the son of Cronus (Saturn) and Philyra, born before the Argonautic expedition. He was taught by Apollo and Diana, and was skilled in hunting, gymnastics, botany, medicine, music, and the art of divining future events. He lived at the foot of Mt. Pelion, in Thessaly, and such was his fame for wisdom that almost all the noble youths of Greece resorted to his cave for instruction. Among his pupils were Hercules, Peleus, who was also his grandson, Nestor, Castor and Pollux, Ajax, Achilles, Ulysses, and Diomedes. When the other centaurs were about to kill his grandson Peleus, Chiron saved his life, and it was only by means of Chiron that Peleus was enabled to obtain his beloved Thetis for his wife. The Argonauts, on their expedition in quest of the golden fleece, stopped at the abode of Chiron, were kindly entertained by him, and received from him a chart of the constellations, which he made to assist them in their navigation. Hercules was one of his favorite pupils, but an arrow from his bow shot at another centaur unfortunately killed his beloved preceptor. Chiron was immortal; but when pierced by the arrow of Hercules, he gave up his immortality to Prometheus, and died.

CHISAGO, an E. county of Minnesota, separated from Wisconsin on the E. by the St. Croix river; area, 450 sq. m.; pop. in 1870, 4,358. It is watered by affluents of the St. Croix, and by Rush, Chisago, and other lakes. The surface is uneven and partly occupied by pine forests. The Lake Superior and Mississippi railroad passes through it. The chief produc-

tions in 1870 were 32,857 bushels of wheat, 13,603 of Indian corn, 39,596 of oats, 16,975 of potatoes, 6,242 tons of hay, and 100,975 lbs. of butter. There were 378 horses, 1,027 milch cows, 1,774 other cattle, 1,387 sheep, and 988 swine. Capital, Chisago City.

CHISHOLM, Caroline (Jones), an English philanthropist, born at Wootton in 1810, died March 25, 1877. In her 20th year she married an officer of the Indian army, with whom she proceeded to Madras, where she established a school for the orphans of British soldiers. In 1838 she removed with Capt. Chisholm to Australia, and at Sydney she found a new call upon her exertions in the numerous young women landed there in destitution from emigrant ships. Having obtained an old building for an asylum, she trained and instructed the girls while under her charge, and found situations for both men and women. Between 1841 and 1845 she procured employment for 11,000 persons, to whom she had lent in small sums £1,200, the whole of which, excepting £16, was repaid to her. She returned to England in 1846, with thanks and a testimonial from distinguished citizens of Sydney; instituted the family colonization society, by which passage money was paid in weekly instalments; and in many ways planned to relieve emigrants of the poorer classes. She went back to Australia in 1854, but returned to England in 1866. During her first residence in Australia she published "Voluntary Information of the People of New South Wales."

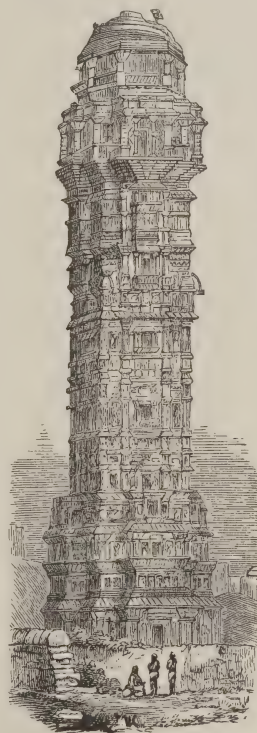
CHISWICK, a village and parish of Middlesex, England, 5 m. W. of Hyde Park corner, London, on the left bank of the Thames; pop. in 1871, 8,508. It is one of the most charming suburbs of London, and contains handsome villas, the gardens of the London horticultural society, and Chiswick house, a celebrated suburban villa belonging to the duke of Devonshire, where Fox and Canning died, and where Paxton, the architect of the crystal palace of 1851, was employed previous to being transferred to the duke's country seat at Chatsworth.

CHITON, a genus of marine animals, generally arranged as a family of gasteropod mollusks. The shell is composed of eight transverse im-

The animal has a broad creeping disk, like the limpet; no eyes, no tentacles, but a long linear tongue in a cartilaginous proboscis, well armed with teeth. Heart central, and elongated like the dorsal vessel in annelids; sexes united; intestine straight, and anal orifice posterior and median. The name is derived from the resemblance of the shell to a coat of mail (Gr. *χιτών*). More than 250 species are known, occurring in all climates, throughout the world; most abundant on rocks at low water, but some live at a depth of 100 fathoms; they have existed from the Silurian period. It is an aberrant form of mollusk, and some are inclined to place it rather among articulate, or at least as a form leading to the articulate. Some of the tropical species grow to a large size, and their muscular foot is often used as food.

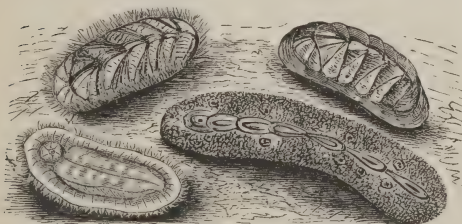
CHITORE, Chittor, Chetore, or Chittorgurh, a town of British India, formerly the capital of the rajahship of Odeypoor, situated on the river

Biruch or Beris, over which is a bridge of nine arches, 36 m. N. W. of Neemutch, and 100 m. S. of Nusseerabad; lat. $24^{\circ} 52' N.$, lon. $74^{\circ} 41' E.$ It contains three large temples, and a remarkable structure called the pillar of victory, erected in 1439 to commemorate the defeat of the combined armies of Malwa and Guzerat by Rana Khumbo, who governed Odeypoor from 1418 to 1468. It is 122 ft. high, covered with mythological sculptures in white marble, and has nine stories, the whole surmounted by a cupola. There are several large reservoirs, but the most important feature of the town is its fortress, built on a high scarped rock,



Pillar of Victory.

and considered a work of great strength. Its walls, though enclosing only an irregular and not very extensive area, are said to describe a circuit of 12 m. Most of the notable buildings are within this enclosure. After undergoing several changes of rulers, Chitore was stormed by the emperor Akbar in 1568, when the Rajpoot garrison, 8,000 strong, after exhausting every means of resistance and all hope of relief, sacrificed their wives and children, and



Chiton squamosus and *C. spinosus*.

bricated plates, attached to a thick mantle which forms an expanded margin around the body; the border of the mantle is either bare or covered with minute plates, hairs, or spines.

rushing upon the enemy perished almost to a man. It was afterward recovered by the Rajpoots, was captured by Aurungzebe about 1676, and reverted to the Rajpoots on the dismemberment of the empire of Delhi, toward the close of the 18th century.

CHITTAGONG, or *Chittagaon*. **I.** A district of British India, lying beyond the Ganges, but included in the province of Bengal, bounded N. by independent Tipperah, E. by Burmah and Aracan, S. by Aracan, and W. by the bay of Bengal, between lat. $20^{\circ} 45'$ and $23^{\circ} 25'$ N., lon. $91^{\circ} 32'$ and 93° E.; length from N. to S., 185 m.; greatest breadth, 80 m.; area, exclusive of wooded hill tracts on the E. frontier, about 3,000 sq. m.; pop. about 1,000,000. It has several rivers, the chief of which is the Chittagong, which is formed by the junction of the Kurrumfoolee and the Chingree, and flows into the bay of Bengal. A large part of the surface is occupied by portions of the great mountain range extending from Assam S. to Cape Negrais, and several of the summits in this district have an elevation of from 3,000 to 8,000 ft. above the sea. The climate is similar to that of Bengal, except that the rainy season is longer. The agricultural products, most of which are obtained with little labor, are rice, sugar, hemp, oats, tobacco, mustard, betel nut, indigo, ginger, and coffee. The exports are timber, salt, coarse cloth, and elephants, of which many are annually caught here for the government. The inhabitants are aborigines resembling the Burmese, Bengalese, and Mughs; the Mohammedans outnumber the Hindoos in the proportion of 3 to 2. The mountains are the retreat of several wild tribes whom no government has ever reduced to subjection. During the wars between the Moguls and Afghans, Chittagong was held by Aracan, from which it was conquered by Aurungzebe toward the close of the 17th century. It was ceded to the East India company by the nawab of Bengal in 1760, and has been included in the government of Aracan since the company acquired the latter from Burmah in 1826. **II.** The capital of the above described district (sometimes called Islamabad), an unhealthy, declining place, on the river of the same name, 212 m. E. of Calcutta, and 160 m. N. of Akyab. It was once important for trade and ship building, but rice, which it once largely exported, is now got more cheaply in the ports of Aracan, and its ship building business has been transferred to Maulmain in Tenasserim.

CHITTELDRÖOG, or *Chitradrug* (anc. *Sitala Durga*, "the spotted castle"), a town of British India, in the province of Mysore, capital of a district of the same name, 280 m. W. N. W. of Madras, 125 N. of Seringapatam, and 70 m. S. of Bellary; lat. $14^{\circ} 14'$ N., lon. $76^{\circ} 27'$ E. It is situated in a fertile plain, noted for the excellence and variety of its fruits. The town is neither large nor populous, but was formerly one of the strongest places in India. Its fortress, crowning a high rock at the back of the

town, is one of the finest specimens of rock fortification in S. Hindostan. Walls of solid masonry encircle it several times with many intricate windings, and completely guard every accessible point. The ascent is performed partly by the aid of notches cut in the rock. Hyder Ali besieged the town in 1776, at which time it was held by a warlike and fanatic tribe called the Beders. During the siege they erected upon the highest part of the citadel a temple to the goddess of destruction, upon whose propitiation they thought their safety to depend, and every week, after solemn rites performed before her image, they rushed forth with desperate frenzy to procure human heads to lay at her shrine. These sallies were seldom unsuccessful, and when the place was finally taken 2,000 heads were found piled before the temple. Hyder obtained possession of the town by treachery in 1779. In the neighborhood of Chitteldroog are some curious caverns, supposed to have been used as dwellings by devotees of Siva.

CHITTENDEN, a N. W. county of Vermont, bounded W. by Lake Champlain; area, 517 sq. m.; pop. in 1870, 36,480. It is drained by Lamoille and Onion rivers, which afford valuable water power. Near the lake the surface is generally level, but toward the east it becomes rough and in some places mountainous. Nearly all the land is fertile, suitable for grazing, or capable of producing corn, potatoes, &c. The Vermont Central and the Rutland and Burlington railroads traverse the county. The chief productions in 1870 were 44,426 bushels of wheat, 163,597 of Indian corn, 286,615 of oats, 333,858 of potatoes, 82,629 tons of hay, 1,374,387 lbs. of cheese, 1,761,543 of butter, 87,256 of wool, and 426,726 of maple sugar. There were 4,977 horses, 21,941 milch cows, 8,919 other cattle, 17,041 sheep, and 4,809 swine. There were 2 manufactories of boxes, 7 of cheese, 7 of furniture, 1 of boats, 4 of sashes, doors, and blinds, 3 of woollen goods, 6 flour mills, 6 planing mills, 23 saw mills, 10 manufactories of carriages and wagons, 1 of cotton goods, 3 of iron castings, 2 of machinery, 3 of patent medicines, 5 tanneries, and 4 currying establishments. Capital, Burlington.

CHITTENDEN. **I.** Thomas, the first governor of Vermont, born in East Guilford, Conn., Jan. 6, 1730, died at Williston, Chittenden co., Vt., Aug. 25, 1797. He represented Salisbury, Conn., in the legislature of that state for several years, and was also a colonel of militia and a justice of the peace. In May, 1774, he removed with his family to Vermont, and during the revolutionary war was repeatedly obliged to change his residence. He was a member of the convention at Dorset, in September, 1776, for the purpose of taking into consideration the expediency of declaring Vermont an independent state. He was one of the committee that drafted the Vermont declaration of independence, and was also one of the committee appointed to petition congress to acknowledge the independence of the state. He

was a leading member of the convention at Windsor, July 2, 1777, which formed the first constitution of Vermont, and was president of the council of safety, which was vested with all the powers of government, executive, legislative, and judicial, to be exercised until the government should be organized under the constitution. In 1778 he was elected governor of Vermont, which office he held with the exception of one year till his death. A memoir of him, with a history of the constitution of Vermont during his administration, by Daniel Chipman, was published in 1849. **II. Martin**, son of the preceding, born at Salisbury, Conn., March 12, 1766, died at Williston, Vt., Sept. 5, 1840. He graduated at Dartmouth college in 1789, and commenced farming at Jericho, Chittenden co.; was a member of the convention in Vermont that adopted the constitution of the United States; was appointed side judge of the county court, and reelected for three years, and then appointed chief judge of the same court, and reelected seven years successively. In 1803 he was elected member of congress, and received four reelections. From 1813 to 1815 he was governor of Vermont.

CHITTY, Joseph, an English lawyer, born in 1776, died in 1841. He was eminent in his day as a special pleader, but has a more enduring fame as a writer of legal text books, indispensable to students and practitioners in English law. His chief works are a "Treatise on the Parties to Actions and to Pleadings" (1809); "Treatise on the Law of Nations relative to the Legal Effects of War on the Commerce of Belligerents and Neutrals, and on Orders in Council in Licenses" (1812); a "Practical Treatise on the Criminal Law" (4 vols., 1816); and a "Synopsis of Practice in the King's Bench and Common Pleas" (1816).

CHIUSA, an Italian word for a narrow mountain pass, as for instance the Chiusa dell' Adige, near Verona, and the name of a number of localities in Italy, including a Benedictine abbey, San Michele della Chiusa, on Monte Pirchiriano, near a hamlet called La Chiusa, about 11 m. N. E. of Turin, now used as a hospice and as the burial place of the royal family. The following are the largest towns of the name. **I. Chiusa di Pesio**, in the province and 7 m. S. E. of Cuneo, on the left bank of the Pesio; pop. about 6,500. It is well built, and contains ruins of the old castle of Mirabella. Silk and glass, and particularly mirrors, are extensively manufactured here. A continuation of the Roman Æmilian way passed in this vicinity. **II. Chiusa Sclafani**, Sicily, in the province and 30 m. S. by W. of Palermo; pop. about 7,000. It was founded about 1320 by Matteo Sclafani, count of Aderno. The prominent buildings are the parish church, with pointed arches resting on stunted columns, and a Capuchin convent with a fine picture of the "Adoration of the Magi." Precious metals and iron are said to have been found here in ancient times, and jasper and especially

agates still abound. On a rock 2 m. S. W. of Chiusa is the village of Giuliana, with a castle and fortification constructed by Frederick II. of Aragon.

CHIUSI (the *Camars* of the Etruscans, and *Clusium* of the Romans), a city of Italy, in the province and 38 m. S. E. of Siena, situated



Chiusi.

on a hill in the valley of the Chiana; pop. about 4,200. It was the ancient capital of King Porsena. Its decline was caused in the 11th century by the accumulation of the waters of the Chiana, which changed the surrounding valley into a pestilential marsh. Dante (*Paradiso*, xvi.) describes its depopulation. The valley was drained by works completed in 1823, and Chiusi is now the seat of a bishopric, has a beautiful cathedral, and several rich museums of Etruscan and Roman antiquities. On a mountain E. of the town stands the monastery Sagra di San Michele, one of the most notable religious structures in central Italy. (See **CLUSIUM**.)

CHIVALRY (Fr. *chevalerie*, riders of horses), an institution forming the special characteristic of European civilization in the middle ages. It flourished from about the beginning of the 10th century to the end of the 15th; a century more for its rise and another for its decline will include the period of its existence as an organized institution. Almost every feature of chivalry has existed in all ages and among all peoples except utter savages. Its germs, especially in its avowed relations to the female sex, existed in the German forests long before the Christian era, although they remained undeveloped until after the destruction of the Roman empire and the establishment upon its ruins of the states of modern Europe. During the period between the 5th and 10th centuries there existed in that part of Europe which had been a portion of the Roman empire scarcely a trace of culture except in the cloisters, scarcely any safety to person or property except such

as had come into the possession or under the direct protection of the church. Elsewhere the strong hand was the only law. In time the spirit of the church began to spread beyond the cloister, and here and there a brave and humane man would take upon himself the task of protecting the weak and redressing the wrongs of the injured. Women, being the weakest and most liable to suffer wrong, naturally first claimed this protection; and so to courage was added courtesy and refinement, and at least in theory chastity and temperance, as essential to the character of these self-appointed champions. These naturally associated themselves for mutual aid and protection. The church was eager to aid and be aided by this growing institution; and so it early took upon itself a religious form. France was the country in which the new civilization first gained strength; and here the institution of chivalry first took form. From France the institution spread to England, Spain, southern Germany, and southern Italy. Ethnologically the order belonged to that branch of the Teutonic family which had overrun these countries, which then mainly constituted Christendom. The crusades suddenly melted all Christendom into a sort of body politic, of which chivalry and the church became the notable characteristics. The decrees of the famous council of Clermont (1095), which sanctioned the first crusade, indicate the importance which the institution of chivalry had then attained. This council, after confirming and extending the "truce of God" (see TRUCE OF GOD), formally recognized the institution of chivalry by decreeing "that every person of noble birth, on attaining 12 years of age, should take a solemn oath before the bishop of his diocese to defend to the uttermost the oppressed, the widows and orphans; that women of noble birth, both married and single, should enjoy his special care; and that nothing should be wanting in him to render travelling safe and to destroy the evils of tyranny." In this decree all the amenities of chivalry were sanctioned by the civil and ecclesiastical power. It will be noted that, unlike the church, which in theory at least recognizes the right of all men to all her privileges and immunities, chivalry had nothing to do with any except those of gentle birth; but by the decree of the council every male person of such birth was from childhood enrolled as a candidate for the order. The training of the chevaliers, or, as we usually style them, the knights, grew into an elaborate system of education, admirably adapted to its purpose. Except for those who should enter the church, there was no career but that of arms. Every noble youth was to be trained as a soldier. This training was seldom carried on at home. Youths of the highest rank were usually educated at the court of the sovereign or at the castle of some neighboring lord. The importance of a noble was measured to a great extent by the number of his followers. The

castle of every noble of wealth and repute became a kind of school for the training of the sons of his friends and neighbors. The education of the boy began at the age of 8 or 10. He was taught the rules of courtesy and the mysteries of hunting, and trained in riding and the use of the weapons fitting his age and strength, and was styled a valet or page. At the age of 14 he was held fit to become an esquire or squire, that is, a shield-bearer, and to accompany his master to the battle field, rather as a spectator than as a combatant. At 21, and sometimes earlier, he might become a knight. The full induction to the order was sometimes made on the battle field, when the forms were few and brief; but when the rank of the candidate and the circumstances permitted, the induction was accompanied by elaborate religious rites, at the close of which he received from the investing knight the *accolade*, or three blows with the flat of the sword, with the words, "In the name of God, of St. Michael, and of St. George, I dub thee knight; be brave, bold, and loyal." Originally every knight had the right to confer the dignity, but in course of time this came to be restricted to sovereign princes, and to the commander of a royal army in the field. Only a small portion of the squires became knights, although all were entitled to claim the honor. The knight required several horses, a squire or two, and a number of attendants. Unless he had considerable estates, or had won renown for valor and skill sufficient to gain for him a large *guerdon*, he would not be able to defray all these expenses; and so most of them remained squires, attached to the service of some prince or baron, or not unfrequently in a state of independence, hiring out their own military services, and those of such men-at-arms as they could gather around them, to any one who was able to pay their price. These squires must be distinguished from those others who were the attendants of knights, and undergoing training for the order of knighthood. Not a few of the stoutest soldiers of chivalry were never more than squires, and a brave squire not unfrequently had under his control a large band of followers. He was entitled to lead these to the field under his own banner. The especial standard of a squire was the pennoncel, a long, narrow triangular flag, in distinction from the forked or swallow-tailed ensign of a knight, which resembled two pennoncles united at the base or flag staff, and the square pennon of the barons or great feudatories. Every knight had the right to ask of his sovereign or immediate commander in the field the privilege to use the square pennon. This request was granted if he had won renown at arms, and had a sufficient number of followers, which later became fixed at not less than 30 lances, with the requisite number of men-at-arms. The commander took the forked flag, cut off the points, and returned it thus transformed into the square pennon. The knight then became a

knight banneret, a degree which has sometimes, though improperly, been considered a separate order of chivalry; but it was really only a grade in the same rank, merely giving military precedence over the other knights, who in time came to be designated as *bas-chevaliers*, or bachelors.—The strict definition of a knight or chevalier is one who fights on horseback; the Germans called him a *Ritter*, or rider. His proper arms were the lance, the two-handed sword, sometimes a battle axe or mace, and a short sharp dagger. He was clad in complete armor, and his horse was also protected. When mounted and armed, he was almost invulnerable against any opponent of the time, except one equally armed and armored. His coat of mail was proof against any missile but the shaft from the formidable longbow, used only by English archers. The ineffective weapons of the common European soldiers could not touch him; the keen scimitars of the Saracens, which would sheer off a limb or a head, were useless against him. A score of knights could ride unharmed through a host of common soldiers. So the crusaders found it against the Saracens, and the Spanish conquistadors against the Aztecs. But the knight, once unhorsed and thrown upon his back, was as helpless as a turtle in the same position. He could not even gain his feet without assistance, and no matter of what proof his armor was, there must be some joint or opening through which a dagger could penetrate, or it might be battered in with a club or stone. The ideal knight of the middle ages was a man trained to the use of arms, imbued with generous sentiments, and possessed of all the humane virtues. He was ideally brave and courteous, chaste and temperate, generous and pious. Guizot has digested into 25 articles the various knightly oaths as administered at different periods. The man who even measurably observed them might fairly be considered a secular saint. But the actual knight of chivalry, even taking into account only its most illustrious examples, fell far short of this standard. The exaggerated devotion with which he was supposed to regard his lady love, which should, as an old writer phrases it, "defend him from pride and the other deadly sins of anger, envy, sloth, and gluttony, and render it impossible that his conduct should ever be stained with the vice of incontinence," became in effect only a veil to cover the grossest amatory license. The morals of the age of chivalry, tried by any modern standard, were gross and licentious. The romances of chivalry, which must be accepted as a fair picture of the social morals of the time, are mostly unfit for reading. Chivalry indeed bound the aristocracy together, and caused the knights and squires of even hostile and warring nations to sympathize with each other, and observe many amenities of warfare. But the chivalry who had today fought with each other were ready tomorrow to unite to exterminate a squalid

peasantry who had been driven to insurrection by intolerable outrage. Here and there, indeed, a knight or noble would protect his vassals, just as he would protect his horse or hound; but that the common people had any intrinsic rights as against the will of a noble was an idea which never entered into the code of chivalry. War was the main business of a knight; but in the most turbulent times men cannot be always fighting. The chase, tournaments, jousts, and other games of mimic warfare were the occupations and amusements of chivalry. The tournament was the most elaborate form of these martial games. Tournaments were held under the auspices of some sovereign or great noble, and were attended by ladies, who bestowed the prizes won by the successful combatants. The combats, whether between individuals or companies of knights, were conducted in accordance with fixed rules, which no one might violate. The jousts and passages of arms were merely less formal combats. They might be simply a duel to decide a private quarrel, or a knight, merely to display his prowess, would challenge all comers to encounter him. A class known as knights errant arose, whose special avocation was to encounter any opponent who might present himself. They were the chivalric representatives of the champions in the modern prize ring. The aspects of chivalry were considerably modified by the circumstances of the different countries in which the institution existed. In Spain the chief business of the knights was to fight against the Moors, and hence hatred and contempt of infidels came to be the marked characteristic of Spanish chivalry. In England the predominance of the order was kept in check by the yeomen and archers, who formed a military body unknown in France. During the crusades arose the great military orders, semi-monastic in their character, such as the knights templars and the hospitaliers or knights of St. John, formed for the defence of the Holy Land; and later the Teutonic knights, who afterward undertook to exterminate heathenism in the north of Europe.—The institution of chivalry sank gradually under a combination of physical and moral causes, the changes introduced into the art of war, and the equally great changes in the social and political condition of Europe. Society advanced as the power of the great nobles and feudatories declined. Many of the nobles had sold their estates to fit themselves out for the crusades, and lost their lives in the Holy Land. Those who returned found that towns had sprung up near their castles, filled with burghers ready and able to defend by force of arms the privileges which they had bought or wrested from their feudal lords. Slowly it began to be discovered that infantry could be so armed and manœuvred as to withstand the shock of cavalry. At the battle of Morat (1476), the Burgundian chivalry, the finest in Europe, led by

Charles the Bold, were shattered against the ranks of the Swiss pikemen, and the old superiority of the knights disappeared. When a few years later firearms were so improved as to become weapons of precision, the value of the knightly armor was wholly destroyed. An arquebusier was more than a match for a knight in the field. The knights laid aside their heavy mail, their long lances, and two-handed swords, and chivalry as a special military organization disappeared. By the end of the 16th century chivalry as an institution had disappeared. The descendants of the French knights became courtiers, more and more dissolute and effeminate from generation to generation, until the very name of noble was swept away by the revolution. The place of the institution of chivalry in the world's history is clear. It was good in that it partially took the place of something much worse. If men must fight, it is better that the horrors of war should be ameliorated by some rules of amenity. The benefits which chivalry conferred upon the world were many and great, and cannot be questioned. For the rest, it is safe to affirm that the general condition of society in the best parts of Christendom, during the best days of chivalry, was worse than it now is in the worst parts of the civilized world.

—The literature connected with chivalry runs through all the history, fable, and poetry of the period of its existence. Among the most important modern works relating to it are: *Mémoires sur l'ancienne chevalerie*, by De la Curne de St. Palaye (Paris, 1759-'80); *Collection historique des ordres de chevalerie*, by Perrot (1836); *Dictionnaire historique des ordres de chevalerie*, by Gourdon de Genouillac (1853); *Ritterzeit und Ritterwesen*, by Büsching (Leipsic, 1823); *Ritterwesen und die Templer, Johanniter, etc.*, by Weber (Stuttgart, 1822-'4); especially the very complete *Geschichte des Ritterwesens*, by Reibisch (Stuttgart, 1842); the "History of Chivalry," by Mills (London, 1825); "Chivalry and the Crusades," by G. P. R. James (London, 1825, and often reprinted). Sir Walter Scott's article "Chivalry," in the "Encyclopædia Britannica," almost a volume in itself, gives a graphic sketch of the character of the institution; and several of his novels, notably "The Talisman," "Ivanhoe," "Count Robert of Paris," "Castle Dangerous," and "Quentin Durward," contain vivid pictures of the manners and habits which prevailed during the age of chivalry.

CHIVASSO, or **Chivas** (anc. *Clavisium*), a city of Italy, situated in a fertile plain on the left bank of the Po, on the railway from Turin to Ticino, in the province and 14 m. N. E. of Turin; pop. about 5,000. It has a church dating from 1425, five convents, and the ruins of an ancient castle or palace of the counts of Montferrat. Its trade is chiefly in grain and cattle; it is also celebrated for its lampreys. For a long period it was regarded as the key of Piedmont, and was well fortified, but its de-

fences were destroyed by the French in 1804. A few miles below, on the other side of the Po, are the remains of the ancient city of Industria, discovered in 1745.

CHLADNI, **Ernst Florens Friedrich**, a German physicist, born in Wittenberg, Nov. 30, 1756, died in Breslau, April 4, 1827. Educated for the profession of law, he early left its practice and gave himself to the science of acoustics. He was especially successful in experimenting upon the velocity of sound in various bodies, gaseous and solid; and even more so in experiments and calculations on the movements of plates of glass when in acoustic vibration. He also distinguished himself by being the first scientific man who defended the popular opinion of the fall of solid bodies from the sky. Chladni was the inventor of the musical instruments called the euphonon and the clavicylinder. His principal works are: *Entdeckungen über die Theorie des Klanges* (Leipsic, 1787); *Die Akustik* (Leipsic 1802; translated into French, *Traité d'acoustique*, Paris, 1809); *Ueber Feuermeteore* (Vienna, 1819); *Neue Beiträge zur Akustik* (Leipsic, 1817); and *Beiträge zur Akustik und zur Lehre vom Instrumentalbau* (Leipsic, 1822). (See ACOUSTICS.)

CHLAMYPHORUS, or *Chlamydophorus*, a name first given by Dr. Harlan to a small mammal, a native of Chili, which seems to form a connecting link between the edentates and the insectivora; it is placed, however, among the former, and by Gray near the armadillo; its native name is *picchicago*. It is about 5½ inches long, the top of the head, back, and hind quarters being covered with 24 rows of plates, of a consistence greater than that of leather; at the end of the body this covering is suddenly curved downward, so that the creature looks as if the body had been here chopped off; hence its name *Ö. truncatus*. The lower parts are covered with a soft fur, like that of the mole; the head is conical; molar teeth $\frac{3}{4}$; most of the ribs, as in birds, are united to the breast bone without cartilages; the tail is short, strong, curved



Chlamyphorus.

beneath the body, and evidently used for removing backward the earth accumulated between the limbs during its burrowing; fore limbs strong and mole-like for digging. It lives

under ground like the mole, feeding on worms and subterranean insects; the eyes are very small. This curious animal resembles the mole in its form, subterranean habits, and fore limbs; it comes near the sloths in the teeth, near the armadillo in its covering and the general characters of the skeleton, and near the monotremata and birds in the breast bone, ribs, and open pelvis.

CHLAMYS (Gr. *χλαμύς*, a scarf), an outer garment of the ancient Greeks and of the oriental races. It somewhat resembled the *paludamentum* of the Romans, and in the reigns of some of the later emperors was adopted by them. It was a woollen garment, and differed from the blanket, *ῥιπίδιον*, which was the usual dress of the male sex among the Hellenic races, in being much smaller, of a finer material, often variegated in brilliant colors, and otherwise richly ornamented. It was also, in its usual form, oblong instead of square, being twice as long as it was wide; but it was sometimes increased in volume by the addition of two gores, or wings, in the shape of obtuse-angled triangles, sewn on the long sides with the apices upward. With this improvement it was known as the Macedonian or Thessalian chlamys. The usual mode of wearing the chlamys was to fasten the corners of the shortest side by means of a clasp (*fibula*, *περόνη*) on the middle of the chest, when the garment fell down over the back to the knees, or on the right shoulder, when it hung over the left arm and side, much after the fashion of the short cloak of the Elizabethan costume in England, commonly, though improperly, supposed to be of Spanish origin. In the latter mode it was often worn over armor as an ornament or insignia of dignity, especially by generals and officers of superior rank. The chlamys worn by boys was ordinarily yellow, the military chlamys scarlet; and it was remarked afterward as of evil omen, that on the fatal day of Carrhæ Crassus wore a dark-colored chlamys or paludamentum. The chlamys of women had often a rich fringe or border, and was many-colored and richly embroidered. It was not unusual to twist the chlamys about the arm, so as to serve as a shield; as was done by Alcibiades, when he died fighting against his murderers.

CHLOPICKI, Józef, a Polish general and dictator, born in March, 1772, died at Krzeszowice, Sept. 30, 1854. At an early age he entered the military service, and distinguished himself in the war for independence under Kosciuszko. After the surrender of Warsaw to the Russians (1794) he retired, went to France, and enlisted in the service of the Cisalpine republic, under the command of Gen. Dombrowski. When in 1806 Dombrowski and Wybicki called the Polish nation to arms, under the protection of Napoleon, promising the return of Kosciuszko, Chlopicki, returned to his country, and served with distinction in the great battles of Eylau and Friedland (1807) in the East Prussian campaign. From 1808 to 1811 he fought in Spain,

taking part in the siege of Saragossa, and in the protracted war in Aragon, Catalonia, and Valencia, where he defeated Palafox, Mina, and others. The campaign against Russia in 1812 promised the restoration of Poland, and he gained new distinction in the battles of Smolensk and on the Moskva, where he was wounded. He then followed the retreating French army, but not having received the promotion to which he considered himself entitled, he resigned, and was living in retirement when the armies of the coalition entered Paris in 1814. On the invitation of Alexander of Russia, who assumed the title of king of Poland, and gave the new kingdom a constitution and a national government, he entered the ranks of the new Polish army as general of division; but the wild and capricious temper of its chief commander, the grand duke Constantine, soon caused him to retire. After the night of Nov. 29–30, 1830, which expelled Constantine from Warsaw, Chlopicki was called upon by the general voice to put himself at the head of the nation; but having no faith in the success of the insurrection, he hesitatingly joined the provisional council of administration, and could hardly be persuaded to accept the dictatorship, which he assumed, however (Dec. 5), on the field of Mars, but with the declaration that he would resign his dignity to the national diet immediately after the meeting of that body. But the diet confirmed him in his office, one voice only opposing. He maintained order and discipline; but his temporizing movements, his fear of failure, his strict observance of the narrow limits of the kingdom as created by the treaty of Vienna in 1815, and his negotiations with the emperor, proved to the patriots that they had fallen into error in the choice of a leader. On Jan. 23, 1831, Chlopicki laid down his office and his military command, and proved his patriotism after the declaration of independence by serving in the battles of Wawer and Grochów (Feb. 19 and 25), as a common soldier and adviser of the new commander-in-chief, Prince Radziwill. In the second battle of Grochow he led a regiment against the Russians; three horses had already been shot under him, yet he was still advancing, when a double wound compelled him to retire, and checked the Polish advance. To restore his health he went to Cracow, where he remained after the fall of Poland, under surveillance, being but seldom allowed to leave the place.

CHLORAL (synonymes, trichlormethyl, hydrocarbon oxide, trichloraldehyde, trichloroacetyl, oxide hydrate), a chemical compound first obtained by Liebig in 1831 by the action of chlorine upon absolute alcohol. The name is composed of the first syllables of the words chlorine and alcohol. Although Liebig first prepared chloral, we are chiefly indebted to Dumas for a knowledge of its properties and constitution. It is obtained by passing dry chlorine gas through absolute alcohol as long as it is absorbed, during many hours, keeping the vessel cool

in the early stages of the operation; later the temperature must be gradually raised until the liquid boils. The reaction is represented by the formula $C_2H_6O + 8Cl = C_2HCl_3O + 5HCl$. If dilute alcohol be employed instead of the absolute, no chloral is formed, but in its stead aldehyde, acetic acid, and hydrochloric acid; hence the necessity of using absolute alcohol. It is also difficult to prevent the formation of other compounds, especially chloride of carbon, which serve to contaminate the chloral and render its administration dangerous. Chloral is also produced by the direct action of chlorine on aldehyde, also on starch or sugar.—Chloral is a limpid, colorless, oily liquid, with a fatty taste and a strong caustic smell, producing lachrymation. Its specific gravity is 1.502, and it boils at 95° C., and can be distilled unchanged. It dissolves sulphur, phosphorus, bromine, and iodine, and combines directly with water to form a hydrate. A little chloral put into a moist flask deposits star-shaped crystals of the hydrate on the sides. It changes after a time into a porcelain-like mass called metachloral, which is insoluble, though isomeric with the liquid form. It can be reconverted into chloral by distillation. The white metachloral is insoluble in alcohol and ether, as well as in water, but by contact with water it is gradually converted into the crystallized hydrate of chloral. Fuming nitric acid converts chloral into trichloroacetic acid. An alcoholic solution of potash converts chloral into formiate of potash and chloroform. Chloral is closely allied to aldehyde; it reduces silver from the ammonia nitrate solution, and forms crystalline compounds with ammonia and the acid sulphites of the alkalies. Nascent hydrogen converts it into aldehyde. If chloral be mixed with one equivalent of alcohol, white transparent hygroscopic crystals of chloral-alcoholate are formed. This compound has different properties from the hydrate of chloral, and ought not to be mistaken for it. Chloral combined with one equivalent of water forms a crystalline mass, now popularly known under the name of chloral hydrate. According to Dr. Squibb, when the water of hydration is in excess, or when solid compounds of hydrate of chloral and water are put up, the substance is deliquescent, or even melts in warm weather, and a very slight excess of water manifests itself very soon by some degree of deliquescence. Whether in a cake or crystal, it is now very generally put up slightly deficient in water of hydration; that is, the chloral is not fully saturated to a hydrate, which gives the best product for preservation. Accurately, hydrated chloral crystallizes at about 48° to 49° C. (118.4° to 120.2° F.). A little ammonia may be added to prevent acid reaction, and all acid hydrate of chloral should be rejected. The hydrate of chloral is readily dissolved by water, alcohol, ether, oil of turpentine, benzole, bisulphide of carbon, and the fixed oils. When equal parts of camphor in small pieces and hydrate of

chloral in crystals are allowed to stand in a flask, they form a clear solution. The analysis of chloral hydrate is accomplished by measuring in a graduated tube the amount of chloroform liberated by a given quantity of potash.—The enormous production of chloral hydrate has led to an investigation of its possible application in the arts and of uses for the incidental products accompanying its preparation. The precious metals are easily reduced by chloral hydrate and caustic alkalies. A large quantity of hydrochloric ether appears as a by-product in the manufacture of chloral, and is applied to the preparation of ethyl ammonias. A mixture of hydrate of chloral with three times its weight of fuming nitric acid is allowed to stand in the direct sunlight for three or four days until red fumes no longer appear; it is then distilled at a temperature of 194° C., and the product is found to be pure trichloroacetic acid.—Chloral hydrate was brought forward as an anæsthetic and hypnotic by Dr. Otto Liebreich in 1869. In the presence of alkalies chloral hydrate is decomposed into chloroform and formic acid; the latter unites with the alkali. The decomposition is supposed by Liebreich to take place in the blood, and the chloroform which is thus set free acts in the usual manner. This is almost the only example of an *à priori* discovery of a useful drug, and it is therefore to be regretted that the chemical evidence of such a transformation as that just indicated actually taking place in the blood is not more complete. Chloral hydrate, or as it is very frequently called chloral, has proved to be a valuable addition to the materia medica, although it cannot replace chloroform or ether as a surgical anæsthetic. It produces when acting favorably a quiet and natural sleep, although in rare cases no effect is observed from ordinary doses, and in some instances delirium arises from it. The average dose is from 15 to 30 grains. More than 30 grains at once has sometimes produced alarming symptoms. Death has resulted from still larger doses. It is a drug which should always be administered with caution, even in small doses. It is used to procure sleep in wakefulness from various causes and in many nervous diseases, as insanity, delirium tremens, neuralgia, tetanus, and strychnia poisoning. It is said that the use of chloral as a narcotic without medical advice is becoming a not infrequent habit. Properly administered, it will produce sleep, diminish sensibility and irritation, relax spasmodic action, and contract the arterioles of the system. Improperly used, it will retard the pulse, alter the blood globules, lower the temperature, and produce anæsthesia, muscular relaxation, and death. It should always be given largely diluted with water. The solutions of chloral hydrate in gum water, sirup, &c., undergo spontaneous decomposition, and become dangerous. The tinctures and anodynes kept on sale should be avoided.

CHLORALUM, a trade name given by Prof. John Gamgee to the hydrated chloride of alu-

minum. It has been prepared as an antiseptic and disinfectant, and also for use in medicine.

CHLORATES, monobasic salts of chloric acid, HClO_3 , having the general formula MClO_3 . They are all soluble in water, and are transformed by heat into oxygen and a metallic chloride. The only one which possesses much importance in medicine or the arts is the potassium chlorate, which will be treated of with the salts of that metal.

CHLORIC ETHER, a name sometimes given to Dutch liquid, or bichloride of ethylene, and also erroneously applied to chloroform by its discoverer, Mr. Guthrie of Sackett's Harbor. At present it is applied to the preparation officially known as *spiritus chloroformi*, and composed, according to the "United States Dispensatory," of one measure of chloroform in between eight and nine of strong alcohol. A "strong chloric ether," which consisted of one part chloroform and two of alcohol, was used by Dr. John C. Warren of Boston by inhalation, as an anæsthetic in some 50 cases, and was supposed by him to be safer than chloroform. But in fact it possesses no advantages over the more commonly used anæsthetics, and it is at present but little employed for that purpose. The official preparation is a convenient one for the internal exhibition of chloroform, the effect of which is perhaps slightly modified by the stimulant action of the alcohol it contains. Half a dram to a dram may be given (diluted with water) as a dose. If the British preparation of chloric ether, which contains much less chloroform than the American, be used, the effect of the alcohol will be more marked than that of the chloroform. As a sedative and mild anodyne, chloric ether may be used with advantage in nervous restlessness, sleeplessness, and spasmodic affections, especially of the air passages.

CHLORIMETRY, a process chiefly designed to estimate the commercial value of bleaching powder. As this value depends upon the quantity of chlorine which can be liberated from the powders by an acid, Gay-Lussac proposed to estimate the value by measurement of the bulk of a solution of indigo of known strength which a given weight of the chloride is able to deprive of its blue color; and subsequently he determined the amount of available chlorine by the quantity of a standard solution of arsenious acid which could be converted by a known weight of the bleaching powder into arsenic acid. A still more convenient plan has been described by Graham. It depends upon the determination of the quantity of a ferrous salt which a given weight of bleaching powder, in the presence of an excess of acid, can convert into a ferric salt. To perform the operation, a tall narrow tube, called a burette, capable of holding 1,000 grains of water, and graduated into 100 equal parts from above downward, is employed.

CHLORINE (Gr. $\chiλωρός$, green), a gaseous chemical element of yellowish green color, dis-

covered by Scheele in 1774, called dephlogisticated marine acid air, also oxidized muriatic acid, and first pronounced a simple body by Gay-Lussac and Thénard in 1809; a conclusion afterward confirmed by Sir Humphry Davy, who gave it the name it now bears. It occurs very abundantly disseminated over the earth, in salt brines in combination with sodium, with copper as atacamite, with potassium as sylvine, with silver as horn silver, with mercury as native calomel, and in smaller quantities with other minerals and volcanic gases. In the animal kingdom it is found in the gastric juice, in perspiration, &c., and among vegetables in marine plants. It is therefore one of the most abundant constituents of the earth. For laboratory use it can be conveniently prepared by heating in a retort a mixture composed of 10 parts by weight of common salt, 8 parts of manganese dioxide, and 24 parts of sulphuric acid, diluted with 12 parts of water. On a large scale it is usually prepared from hydrochloric acid, which in England is an incidental product. According to Weldon's process, the crude muriatic acid of the soda ash manufactory is decomposed by manganese dioxide, and the resulting manganese chloride is regenerated to be employed again. Deacon has modified the operation by conducting the muriatic acid directly from the condensing towers into a reverberatory furnace along with some oxygen of the air, over bricks saturated with salts of copper. Chlorine is liberated, and the reaction is said to be continuous, as the same copper salt will decompose an indefinite amount of the acid. Enormous quantities of chlorine are thus made in England, to be chiefly used in the manufacture of bleaching powders. Chlorine is a yellowish green, pungent, suffocating gas; specific gravity compared to air, 2.44, 36 times heavier than hydrogen. Under four atmospheres of pressure it can be condensed to a yellow limpid liquid of specific gravity 1.33. Copper, previously heated, burns readily in chlorine; arsenic, antimony, and phosphorus ignite spontaneously. A lighted candle gives off copious volumes of smoke and is soon extinguished; and ignited charcoal also ceases to burn on account of the weak affinity of carbon for chlorine; but hydrogen gas burns readily in chlorine, producing effects similar to those attained by the oxyhydrogen blowpipe. A piece of paper previously saturated with turpentine bursts into flame when plunged into a jar of chlorine gas. The affinity of chlorine for hydrogen is so powerful that if the two gases be mixed in the dark and subsequently exposed to the solar rays, they unite with a loud explosion. The electric light, or burning magnesium, can be substituted for the sunlight in this experiment. Water at 60° F. absorbs twice its volume of chlorine gas; and if the mixture be exposed to cold, crystals of a hydrate of chlorine will form, which resemble ice excepting in crystalline form, and contain variable quantities of chlorine according to the circumstances of

their formation. This hydrate was employed by Faraday in his celebrated experiment of liquefying chlorine gas. Chlorine water is gradually decomposed in the light, oxygen gas being liberated, and hydrochloric acid formed. Schönbein has shown that spongy ruthenium will also liberate oxygen from chlorine water, the same as the sunlight. Chlorine decomposes steam; hence the hydrochloric acid fumes which issue from the crater of Mt. Vesuvius. It will also expel oxygen from many metallic bases at high temperatures. The bleaching properties of chlorine were early investigated by Berthollet, Mackintosh, and Tennant, and through their recommendation many thousand acres of land were restored to agricultural uses which had previously been devoted to bleacheries. (See BLEACHING POWDERS.) Chlorine is a most efficient agent in decomposing putrid and noxious vapors and gases, and it is largely employed as a disinfectant. In combination it is employed in medicine as a stimulant and antiseptic, also as a gargle in scarlatina, putrid sore throat, and in smallpox. When inhaled, it instantly produces great irritation in the trachea, which may prove fatal. The vapor of ether and alcohol affords some relief. The compound of chlorine with nitrogen is a thin yellow oil, somewhat resembling nitroglycerine, excessively explosive, especially in contact with grease or oil.—Chlorine unites with oxygen in various proportions to form anhydrides and acids. The acids are hypochlorous, chlorous, chloric, and perchloric. The salts of hypochlorous acid, called hypochlorites, possess bleaching properties. The salts of chloric acid are called chlorates, and are used in medicine and the arts. The most important is the potassium chlorate. The compound of chlorine with hydrogen, called hydrochloric acid, hydrogen chloride, and muriatic acid, is one of the most important chemical products known in the arts. (See HYDROCHLORIC ACID.)

CHLORODYNE, a name given to several secret preparations, the most important ingredients of which are chloroform, morphia, cannabis indica, capsicum, and hydrocyanic acid. Dangerous and even fatal results have followed its use, as might indeed be supposed from the activity of the substances which enter into its composition, and the uncertainty of its doses.

CHLOROFORM (synonymes, trichlormethane, dichlorinated methyl chloride, and perchloride of formyl), a transparent, colorless oily liquid, discovered in 1831 by Samuel Guthrie of Sackett's Harbor, N. Y., and described by him as "a spirituous solution of chloric ether." Liebig, in a note to an article on chloral, published in Poggendorff's *Annalen* for November, 1831, also mentions this compound under the name of chloride of carbon, and gives the method of its preparation. Soubeiran also discovered it independently of either of the above named chemists; and although his article appeared in the *Annales de physique et de chimie* for October, 1831, that number of the journal was not

printed until the commencement of the year 1832, owing to the disturbed state of affairs in France at that time, and it is evident that he was not acquainted with the properties of "bichloric ether," as he calls it, so early as October, 1831. The priority of discovery in Europe is undoubtedly due to Liebig, and the confusion has arisen from the antedating of the journal in which Soubeiran's article first appeared. There is no question, however, that Guthrie was the first person to prepare chloroform, and to him the honor of its discovery is manifestly due. It has been asserted that from the time of the discovery of chloroform by Guthrie until its application as an anæsthetic vapor, it remained a mere chemical curiosity. This is not correct. In 1831 Dr. Eli Ives, professor of the theory and practice of medicine in the medical institution of Yale college, employed chloroform in a case of difficult respiration, administering it actually by inhalation of its vapor; he afterward published the facts in the "American Journal of Science" for January, 1832. Later Dr. Nathan B. Ives employed it in asthma, and in other cases, reporting upon it favorably. The exact formula of chloroform was determined in 1835 by Dumas, who gave it its present name. It was at first regarded as formic anhydride, in which the whole of the oxygen is displaced by its equivalent amount of chlorine, and hence the name given to it by Dumas. It is now looked upon as methylic ether, in which two atoms of hydrogen are replaced by two atoms of chlorine, and its formula is CHCl_3 .—Dr. Simpson's original paper on chloroform was communicated to the medico-chirurgical society of Edinburgh, Nov. 10, 1847, and he states that Mr. Waldie first made known the liquid to him. The medical profession having been prepared by the success of etherization to receive any new anæsthetic, whenever properly verified, at once accepted chloroform, coming as it did from such high authority as that of the late Dr. Simpson, and the news of its revived application spread rapidly over the globe. Dr. Simpson at once communicated the results of his experiments to Dr. Charles T. Jackson of Boston, who successfully repeated the trials of its anæsthetic properties, Dec. 30, 1847, upon Charles A. Joy, at that time a pupil in his laboratory (now professor of chemistry in Columbia college, New York). The introduction of chloroform into the medical practice of the United States dates from this time, although Dr. Ives had strongly recommended it many years before. It would have been difficult to purchase an ounce of chloroform in the United States in 1847; at the present time (1873) the annual consumption in this country cannot fall much short of 100,000 lbs.—Chloroform can be obtained by the action of hypochlorite of lime (bleaching powders) upon numerous organic substances, such as wine alcohol, wood alcohol, acetone, salts of the acetates, volatile oils, acetic acid, tartaric acid, formic acid, oxalic acid, and other

bodies; but the only practicable method for its production on a large scale consists in the distillation of alcohol from chloride of lime. Six parts of chloride of lime, 24 parts of water, and one part of alcohol are mixed in a capacious still, and the temperature raised as rapidly as possible till it reaches 180° F. The distillation is then continued until about one part and a half has passed over; the products, consisting chiefly of chloroform, accompanied by water, collect in two layers in the receiver, the chloroform constituting the lower layer. It is decanted from the aqueous portion, and agitated with oil of vitriol in order to destroy traces of volatile oils which accompany it; by another rectification it is obtained in a state of purity. Chloroform is a colorless, volatile liquid, of high refracting power. It has a powerful and agreeable ethereal odor, and a sweet, penetrating taste. Alcohol and ether dissolve it in every proportion, but it is very sparingly soluble in water. Concentrated sulphuric acid has no action upon it, and even potassium does not occasion its decomposition. It is inflamed with difficulty, and burns with a greenish, somewhat smoky flame, producing hydrochloric acid as well as carbonic anhydride and water. By admixture with an alcoholic solution of potash it is decomposed, potassic chloride and formiate being produced. Chloroform freely dissolves sulphur, phosphorus, iodine, camphor, resins, gutta percha, caoutchouc, strychnia, morphia, quinia, and fatty bodies. The specific gravity of the liquid is 1.497, of its vapor 4.2; boiling point 142° F.; it remains liquid at 0° F., but can be solidified by sudden evaporation. Chloroform vapor passed over red-hot copper is partially converted into acetylene. Pure chloroform is decomposed by exposure to light and air; but in the dark it remains unaltered in a vessel only half filled with it.—The vapor of chloroform possesses the remarkable power of producing in the person who has respired it complete temporary insensibility to pain. It may be readily inhaled for this purpose by placing a small quantity of the liquid upon a sponge or a handkerchief, which is to be held before the mouth and nostrils; and it is now commonly employed for rendering patients insensible to pain during severe surgical operations. It is of great importance that the chloroform used for this purpose should be quite pure. In some cases it has been found after exposure to a strong light to have undergone spontaneous decomposition. It ought to communicate no color to oil of vitriol when agitated with it. The liquid itself should be free from color, and it should be perfectly destitute of any chlorous odor. When a few drops are allowed to evaporate on the hand no unpleasant odor should be left. At present chloroform is much more largely used than ether for the production by inhalation of surgical anæsthesia. It is generally admitted to have over ether the advantages of rapidity of action, convenience of administration, agreeableness of odor,

and less subsequent nausea. These advantages, however, in the opinion of many physicians in various parts of the world, and especially of nearly all the physicians of Boston, Mass., and of Lyons, in France, are more than counterbalanced by the fact that chloroform is dangerous to life. A marked change of opinion, in favor of ether as against chloroform, has recently taken place in England. A large number of deaths from the inhalation of chloroform have occurred in the hands of the most skilful and experienced physicians. It is true that the number of deaths so produced bears a very small proportion to the total number of administrations, yet it should be remembered that only an extremely small number of deaths have ever been ascribed to the inhalation of sulphuric ether, and those perhaps incorrectly, and that the latter agent is equally efficient at the cost of a trifling inconvenience and a few seconds more time. Deaths from chloroform take place in three ways: 1, gradual asphyxia, for which the remedy is removal of the drug and fresh air; 2, sudden apnea or cessation of respiration, followed by asphyxia, for which the remedy is artificial respiration and the galvanic battery; 3, syncope from heart-shock, for which there is probably no remedy. Besides its use as a surgical anæsthetic, the inhalation of chloroform has been employed in midwifery, and to relieve intense pain, and to control convulsions, especially those produced by tetanus and strychnia. There is no record of death from its employment in obstetric practice in skilled hands, although there seems to be no good reason for its being safer in this department of practice than in others. Inhaled in the quantity of a few drops and largely diluted with atmospheric air, so as not to produce anæsthesia, it is used to relieve cough and irritability of the air passages. It may be administered by the stomach, combined with ether, sirup, mucilage, or glycerine, for the relief of nausea, seasickness, and nervous irritability. The writer has seen two ounces of chloroform, swallowed with suicidal intent, prove fatal in less than an hour. Applied externally, it is an irritant. Dr. Augustus Waller has shown that the admixture of chloroform greatly promotes the rapidity with which belladonna and probably other substances are absorbed by the skin. Chloroform is also used as a solvent in the preparation and purification of alkaloids and other substances for pharmaceutical and analytical purposes. (See ANÆSTHETICS.)

CHLORO-METHYL, or *Bichloride of Methylene*, a substance produced by exposing to sunshine, in a glass globe, chlorine and gaseous chloride of methyl. The products of the decomposition, which consist, in addition to the chloro-methyl, chiefly of chloroform, are collected in bottles, artificially cooled and connected with the generating globe. The chloride of methyl may be made for the purpose by heating together one part of wood spirit, two parts of common salt,

and three of sulphuric acid, and collecting the gas over water. The chloride of methyl possesses anæsthetic properties, but is less manageable than the bichloride, which is the subject of this article. The latter is a colorless liquid, of an odor analogous to that of chloroform, of specific gravity 1.344 and boiling point 88°. Its formula is $C_2H_2Cl_2$. It mixes readily with absolute ether, and the mixture volatilizes evenly and equally. When inhaled it produces, according to Dr. B. W. Richardson, insensibility without previous excitement, and the insensibility when produced continues longer without an additional administration than that caused by other anæsthetics. It may be made to destroy life, but after death muscular irritability remains longer than with some other anæsthetics, and consequently the chances of a restoration of the vital functions are greater. The bichloride of methylene has been somewhat employed as a surgical anæsthetic by Dr. Richardson, who first brought it into notice for this purpose, and by others. It seems to be more agreeable than ether, but unfortunately does not share with ether the superiority over chloroform of being less dangerous to life.

CHLOROPHYL (Gr. *χλωρός*, green, and *φύλλον*, leaf), the substance which gives the green color to leaves and herbage. It may be dissolved from the leaves by alcohol or ether, and is found to consist partly of wax, and partly of a peculiar substance allied to indigo.

CHLOROSIS (from Gr. *χλωρός*, green), a disease characterized by pallor, with a greenish tint of the face. The disease has been called the "green sickness," and is known in past medical literature by a variety of synonyms. It affects chiefly girls at or near the period of puberty, and is generally connected with disorders of menstruation. This function in some cases is either arrested or performed insufficiently, and in some cases there is a marked loss of blood. Modern researches have shown that a constant and essential condition in cases of this disease is the morbid blood-change called anæmia, or impoverishment of the blood; the change consisting in a diminution of the red globules. Many of the symptoms in cases of chlorosis are doubtless attributable to this change in the blood; and some writers consider that the disease is, in fact, simply anæmia occurring especially in young girls, and often when the customary causes of impoverishment of the blood are wanting. The morbid complexion, which is more or less marked in different cases, is due chiefly to anæmia. Other common symptoms are muscular debility, tendency to faintness or syncope, susceptibility to cold, impaired ability for mental effort, with depression and irritability of temper. With these symptoms are often associated defective appetite, with sometimes a morbid craving for innutritious substances, such as chalk and slate; disturbance of digestion, manifested by a variety of symptoms; palpitation of the heart; pain in the side, especially the left side, attributable to

intercostal neuralgia; neuralgic affections in other situations; consumption, leucorrhœa, and various other ailments. A constant sign, representing the blood-change, is the venous hum, called by French writers *bruit de diable* (the word *diable* relating to the toy known as the humming top). This sign is a continuous humming sound, sometimes musical, heard through the stethoscope applied to the neck, especially on the right side, the head being turned as far as possible in a direction opposite to the side on which the stethoscope is applied, and the patient being either sitting or standing. The sound is caused by the movement of the current of blood in the veins of the neck. An abnormal sound, known as a bellows or blowing murmur, is usually heard when the stethoscope is applied over the aorta and pulmonary artery, just above the heart, also over the carotid and other arteries of considerable size. These blood-murmurs are valuable to the physician as evidence of anæmia, and their disappearance serves to show that the anæmic condition is removed. The causation of chlorosis is evidently connected with the evolution of the sexual system, but it is not easy in the existing state of our knowledge to give a pathological explanation of the connection. So far as the anæmic condition is concerned, in some cases this is produced and kept up by immoderate menstruation and insufficient alimentation.—In the medical treatment of chlorosis, the preparations of iron are especially to be relied upon. These are sometimes rapidly effective, but often to secure their full efficiency they must be continued for a long period. Tonic remedies to promote appetite and digestion are useful. Using proper reserve with reference to the risk of abuse, wine may be advised with advantage, and Burgundy wine is generally considered most appropriate. Malt liquors are sometimes taken with benefit. Hygienic measures, however, constitute an essential part of the treatment. These measures consist of out-of-door life, change of scene, mental recreation, and as nutritious alimentation as practicable. The affection is not in itself serious, nor does it involve a tendency to any grave disease. Under judicious management the recovery of health may be confidently expected.—An essential element in chlorosis, as already stated, is anæmia, or impoverishment of the blood. The red globules, instead of being in the normal proportion of from 120 to 180 in 1,000 parts, may decrease to 70, 60, or even nearly to 20. The term anæmia is also employed to denote a deficiency of blood in any of the organs of the body; thus, cerebral anæmia means a deficiency of blood within the substance of the brain. In this sense of the term it is the opposite of hyperæmia, or congestion. Ischæmia is a term lately introduced to express a local anæmia. Anæmia is of frequent occurrence, exclusive of cases of chlorosis, and much more frequent in women than in men. The relative proportion of the

red globules to the other constituents of the blood in health is somewhat less in the former than in the latter; and besides there are several causes of anæmia peculiar to women, namely, child-bearing, lactation, and excessive menstruation. It is an effect of the loss of blood or hæmorrhage in any situation, the explanation being that the red globules which are lost are not quickly renewed, their reproduction requiring more or less time. A deficiency of alimentary supplies, inability of the stomach to retain food, and defective assimilation give rise to the anæmic condition; also profuse suppuration, or the formation of morbid products involving an undue expenditure of the blood constituents. Thus, anæmia is incident to such diseases as chronic pleurisy, albuminuria or Bright's disease, chronic dysentery, &c., which impoverish the blood. Again, certain diseases occasion anæmia by interfering with the production of red globules in modes not fully explicable with our present knowledge. Examples are the so-called malarial affections, lead poisoning, diphtheria, cirrhosis of the liver, &c. The effect of anæmia is to impair the functional ability of all the important organs of the body—in other words, to diminish vital power throughout the system. In the practice of medicine, it is very necessary to take cognizance of the anæmic condition as a pathological element which may either enter into, or be incidentally connected with, a great variety of diseases. The phenomena of anæmia are especially manifested in disorders of the nervous system. Many of the affections of the nervous system which are distinguished as functional, belonging among the affections called the *neuroses*, are in a great measure caused and kept up by the anæmic condition; and the treatment of these affections, to be successful, must proceed from an appreciation of this connection. With reference to the treatment in cases of anæmia, it is of course of primary importance to determine its causes, and if possible to remove them. This is not practicable when the anæmia is incidental to such diseases as consumption, cancer, &c.; but it can be done when the anæmic condition depends on lactation, insufficient alimentation, and certain affections, as for example those due to malaria, which are under the control of medical art. Under all circumstances anæmia offers certain indications for remedies and other measures of treatment which relate directly to the impoverished state of the blood. These have been already stated in connection with chlorosis. If the condition has been produced by causes which are either temporary or removable, the success of treatment strikingly exemplifies the improvement in medical practice derived from the recently acquired knowledge of this morbid condition.

CHMIELNICKI, Bogdan, chief of the revolted Cossacks, under the reigns of Ladislas IV. and John Casimir of Poland, born in 1593, died Aug. 25, 1657. He was the son of a Polish no-

bleman, who settled among the Cossacks of the Ukraine. This people, who had long defended the eastern boundaries of Poland against the Tartars and Russians, were at that time subjected to grievous oppression. Their religion was persecuted, their freedom circumscribed; the castle of Kudak, called the curb of the Cossacks, was built to restrain them. Thus exasperated, they seized Kudak and massacred the garrison, but were soon subdued. After their defeat, Bogdan was sent to the court of Ladislas, where he was favorably received and appointed secretary of the Zaporogian Cossacks. But envy, suspicion, and hatred soon drove him forth, and finally made him a scourge of Poland. The intrigues of Czaplicki, an official at Ozehryn, deprived him of an inherited estate, and of his wife, who deserted him and her religion, and caused his son Timofey to be publicly whipped. Having in vain sought for redress at Warsaw, he entered into a conspiracy with the Cossacks against the Poles, and sought the alliance of the khan of the Tartars, who ordered 80,000 of his people to assist him. He now revolted, and commanded the massacre of all the Poles, Catholic priests, and Jews. The son of the hetman Potocki, who was sent against him, was deserted and fell in the battle at the Yellow Waters, and the hetman himself was made prisoner in that of Korsun (1648). Three other commanders were ignominiously defeated at Pilawce. Chmielnicki was master of the Ukraine, and carried terror, devastation, and death as far as Lemberg and Zamosc, but stopped there, awaiting the result of the election of a king, held at Warsaw. Under the new king, John Casimir, the war was continued with equal cruelty on both sides. Victories and defeats followed by turns, conditions of peace were offered and rejected, treaties concluded and violated, provinces desolated, fiendish atrocities committed; the serfs even of the Polish districts rose for freedom and rapine. Chmielnicki put himself under the protection of Turkey, of Russia (1654), and again under that of Poland (1656). A long war between Russia and Poland broke out after his death, which ended in 1667 with the cession of Kiev, Smolensk, and the Ukraine to the czar.

CHOATE, Rufus, an American lawyer, born at Essex, Mass., Oct. 1, 1799, died in Halifax, Nova Scotia, July 13, 1859. He graduated at Dartmouth college in 1819, was tutor there for a year, then studied law, and in 1824 commenced practice at Danvers, Mass., but soon afterward removed to Salem. In 1825 he was elected representative in the Massachusetts legislature, in 1827 state senator, and in 1832 a representative in congress. He declined a reelection, and taking up his residence in Boston entered upon the practice of his profession, in which he soon rose to the highest rank, being recognized as one of the most acute lawyers and the ablest advocate of the Massachusetts bar. In 1841 he was elected United States senator to fill the unexpired term of Daniel

Webster. In the senate he made several eloquent speeches, but his true sphere was rather that of a lawyer than of a politician. At the close of his senatorial term, in 1846, he resumed his practice in Boston. In 1853 he was attorney general of the state, and was thenceforth to the close of his life the foremost lawyer in New England. He died while on his way to Europe for the benefit of his health. Mr. Choate was perhaps the most effective pleader of the day; and apart from his purely legal efforts, his reputation rests upon two or three speeches delivered in the senate of the United States, and some occasional addresses and orations. The principal of these are a eulogy upon President Harrison (1841), an address upon the anniversary of the landing of the pilgrim fathers (1843), a eulogy upon Daniel Webster (1853), an address at the dedication of the Peabody institution in Danvers (1854), an oration before the young men's democratic club of Boston (1858), two addresses before the law school at Cambridge, and two lectures before the mercantile library association of Boston. His "Works, with a Memoir," by Prof. S. G. Brown, including correspondence, have been published (2 vols., Boston, 1862).

CHOCIM. See KHOTIN.

CHOCO, formerly a province of New Granada, now a district of the state of Cauca, in the United States of Colombia, bordering on the Pacific and touching the gulf of Darien on the N. E.; pop. about 45,000, mostly negroes and mulattoes, with a few whites and Indians. It is traversed by the western branch of the Andes, and drained by the San Juan and Atrato rivers. The climate is warm, moist, and unhealthy. The soil is rich and productive, but agriculture is generally neglected, almost everything that is consumed, excepting plantains, fruit, and fish, being imported. Gold is abundant in the mountains and in the beds of the streams, and platinum is found on the W. side of the Cordillera; but mining and industry are at a low ebb. The principal towns are Quibdo and Novita.—There is a bay of the same name on the Pacific coast, between Points Guascama and Chirambira, lat. 2° 40' and 4° 18' N.; and another, forming the S. part of the gulf of Darien, which receives the Atrato.

CHOCOLATE (Aztec, *chocolatl*), an alimentary preparation, usually a beverage, introduced into Europe by the Spaniards in 1520, and by them kept for a long time a secret. It is prepared from the fruit of the *theobroma cacao*, a name given by Linnæus, who was so fond of it as to call it the food of the gods. (See CACAO.) The ancient Aztecs are said to have been very skilful in its fabrication, producing a froth which on cooling was solid enough to be eaten. Their favorite flavoring was vanilla, but they also used other spices. In the West Indies, the beans on being gathered are immediately dried and packed for market. They thus possess, however, a slightly acrid bitter taste, which in Carácas is removed

by a slight fermentation which is produced by covering them with stones or earth, after which they are dried in the sun. In manufacturing chocolate the beans are gently roasted in an iron cylinder similar to that used for roasting coffee. The development of a peculiar aroma indicates the completion of the process, when the beans are turned out, cooled, freed by sifting and fanning from their husks, and by trituration at a temperature of 130° F. in a mortar or a mill reduced to a paste, which is then mixed with from one half to equal parts of sugar and a small quantity of vanilla bean for flavoring, and, the proper temperature having been preserved, turned into moulds. Chocolate is easy of adulteration, and it is often diluted with farinaceous substances, as arrowroot, sago, or wheat flour, and with animal fats.

CHOCTAW. I. A S. W. county of Alabama, bordering on Mississippi; area, about 800 sq. m.; pop. in 1870, 12,676, of whom 6,872 were colored. The Tombigbee river, which flows along the E. boundary, is navigable by steamboats. It is well watered by affluents of the Tombigbee. The chief productions in 1870 were 227,715 bushels of Indian corn, 47,626 of sweet potatoes, and 6,439 bales of cotton. There were 1,313 horses, 941 mules and asses, 3,133 milch cows, 7,103 other cattle, 2,940 sheep, and 14,082 swine. Capital, Butler. II. A central county of Mississippi, traversed by the Big Black river; pop. in 1870, 16,988 of whom 4,462 were colored. The former area was 990 sq. m., but a portion was taken in 1870 to form Grenada county. Forests of oak, hickory, and other timber occupy much of the land; the remainder is fertile. The chief productions in 1870 were 7,844 bushels of wheat, 432,751 of Indian corn, 10,578 lbs. of wool, and 5,637 bales of cotton. There were 2,276 horses, 1,567 mules and asses, 4,173 milch cows, 7,584 other cattle, 7,618 sheep, and 25,892 swine. Capital, Greensborough.

CHOCTAWS, or **Chahtas**, an extensive nation of North American Indians, who, with the Alibamons, Timuquas, and kindred tribes, and the Muskogees, occupied nearly all the territory on the gulf of Mexico from the Mississippi to the Atlantic. They claimed to have come out of a cave in a hill, which they regarded as sacred. The Chahtas, or Choctaws proper, comprising three divisions or fires, occupied a rectangular territory south of the Chickasaws and west of the Muskogees, comprising what is now central and southern Mississippi and western Alabama. They cultivated the soil and subsisted chiefly by agriculture. They were raw-boned, active, and deceitful. From the practice of flattening the foreheads of their children with bags of sand, they obtained from the French the name of Flatheads. De Soto was the first to enter their territory, seizing the cacique of Coosa, and fighting a bloody battle with them at Mavilla in 1540. The next Spanish force, under Tristan de Luna, in 1560 aided them in a war with the Natchez. When the French set-

tled Louisiana the Chahtas became their allies, and missions and forts were established among them. At this time they comprised 40 villages and more than 2,500 warriors. They aided the French materially in the war against the Natchez, whom they signally defeated, and also against the Chickasaws. The English, however, began to seek their alliance, and won over a part of them, the chief Red Shoes becoming their fast friend. They acknowledged the sovereignty of the United States at the treaty of Hopewell in January, 1786, and were guaranteed peaceable possession of their lands. But as early as 1800 numbers emigrated beyond the Mississippi, and in 1803 it was estimated that 500 families had departed. The whole nation would have followed but for the opposition of the Spaniards and some of the western tribes. They did good service in the war with England and in the Creek war, and in 1820, by

agriculture and the mechanic arts. They are governed by a written constitution adopted in 1838, and amended a few years after so as to harmonize more with state governments. They elect their chief for four years, and have a national council of 40 members and a regular judiciary, with trial by jury. Under this government they advanced rapidly, increasing in numbers, wealth, intelligence, and civilization, and in 1861 had a population, including the Chickasaws, of 25,000, with 5,000 negro slaves. The superintendent and agents appointed by the United States took sides with the seceding states, and led the Choctaws to break with the United States government. Though their territory was not the scene of hostilities, the schools were closed, and the buildings, occupied by confederate troops, became a total loss, while the population was reduced to 17,000, of whom 12,500 were Choctaws. After the war, the government held that, by revolting and making treaties with the Confederate States, they had forfeited all their rights. New treaties were made in 1866, by which slavery was abolished, and part of their lands ceded for other tribes which the government wished to remove. A sort of territorial government was formed, with the superintendent as governor, and the powers of the council defined. The negroes were either to have lands set apart for them in severalty, or \$300,000 in the hands of government was to be taken for their use. Up to 1872 this point remained unadjusted, the Choctaws refusing to divide their lands among themselves in severalty, and being still more reluctant to give separate allotments to the negroes.—The Choctaw language lacks the verb “to be,” and in many nouns, verbs, and adjectives, a plural form. It has many irregular forms, abounds in particles, both prefixes and suffixes, repeats the pronouns, and has many fragmentary pronouns, the article-pronouns involving great difficulty. A grammar by the late Rev. C. Byington (Philadelphia, 1870) gives a very clear view of the language; his dictionary has not yet appeared. The labors of the missionaries for more than half a century, giving them nearly the whole Bible, with spellers, definers, tracts, and hymn books, printed from 1826 to the present time, have made these works standard.

CHODOWIECKI, Daniel Nikolaus, a German painter and engraver, born in Dantzic, Oct. 16, 1726, died in Berlin, Feb. 7, 1801. He was at first engaged in trade in Dantzic and Berlin, but devoted his leisure to the practice of art, and in 1754 he set up as a miniature painter with considerable success. In 1756 he betook himself to etching, chiefly from his own designs, and acquired a reputation equal if not superior to that of any artist of his age in Europe. In 1764 he was appointed rector of the royal academy of arts at Berlin, in 1788 vice director, and in 1799 director. He was very industrious, and labored incessantly till within a few weeks of his death. His prints



A Choctaw.

the treaty of Doak's Stand, ceded to the United States a part of their territory for lands west of Arkansas. Georgia finally extended the state jurisdiction over the whole of the old Choctaw territory, and gave the Indians the rights of citizens. Preferring however to remove, they ceded the rest of their lands by the treaty of Dancing Rabbit creek in 1830, and with the Chickasaws, who had joined them, removed west of Arkansas, between the Arkansas and Canadian rivers on the north and the Red river on the south. They ceded in all 19,000,000 acres, and received 20,000,000, with \$2,225,000 in money and goods. The missionaries of the American board of commissioners for foreign missions had begun their labors among them in 1818, and were followed by the Presbyterians, Baptists, and Methodists. The Choctaws were making rapid progress in

numbered about 2,000, but they were generally small and executed for booksellers and newspapers. His subjects are chiefly illustrative of incidents in common life and history, and are remarkable for their expression. Of his oil paintings, the "Blind Man's Buff" and the "Cock Fight" are in the Berlin museum, and the "Resting Place" in the museum of Leipsic. Jacobi, a printseller of Berlin, published a complete catalogue of his prints in 1814. There is another in Heineken's "Dictionary," arranged according to the subjects. —His son WILHELM (1765–1805) was also a distinguished engraver.

CHODZKO, Alexander Boreyko, a Polish traveller, linguist, and poet, born at Krzywiec, in Lithuania, July 11, 1804. He studied oriental languages at Wilna, went in 1829 to Persia, where he served as dragoman and consul, returned in 1841 to Europe, and has since resided mainly in France. As an author he is known by works in Polish, English, and French. His Polish poems, including translations from the Persian, appeared in Posen in 1833. His "Specimens of the Popular Poetry of Persia, as found in the Adventures and Improvisations of Kurroglou, the Bandit Minstrel of Northern Persia" (London, 1842), are valuable as spirited translations, and for an appendix containing fragments of the original songs in the Turkoman, Perso-Turkish, and Zendo-Persian languages. Among his other works are: *Grammaire persane* (Paris, 1852); *Le dragoman turc* (1855); *Répertoire du théâtre persan* (1856); and *Chants populaires slaves* (1865).

CHODZKO, Jakób Leonard, a Polish scholar, born at Oborek, in the neighborhood of Wilna, Nov. 6, 1800. He studied at Molodeczno, where he enjoyed the friendship of Zan, and at Wilna, under the guidance of the historian Lelewel. Having travelled as secretary of Prince Oginski through nearly all Europe, he established himself in 1826 in Paris, where he published a memoir of the prince, with an introduction entitled *Observations sur la Pologne et les Polonais* (Paris, 1827), and commenced collecting materials for a history of his country from the death of Augustus III. Afterward he published *Histoire des légions polonaises en Italie* (2 vols., Paris, 1829), and several other works relating to Poland. During the revolution of July, 1830, Lafayette appointed him his aide-de-camp; and after the outbreak of Nov. 29 of the same year in Warsaw, he acted as agent of the revolutionary government in France. He was an active member of the French-Polish and American-Polish committees. His writings include *Tableau des révolutions de la Pologne* (1837); *La Pologne historique, littéraire, monumentale, &c.* (3 vols. 8vo, 1834–'47); *Histoire de Pologne* (4to, 1855; 14th ed., 8vo, 1864); *Histoire de Turquie* (4to, 1855); and *Contes des paysans et des pâtres slaves* (1864).

CHENIX (Gr. χοιμή), a dry measure of capacity among the ancient Greeks. Its size is variously given, and it is probable that it differed

in the different states of Greece. Some accounts represent it as containing three *cotylæ*, or about 1·487 pint English; others make it equal to 1·982 pint; and still others give it as equal to 3·964 pints. The *chenix* appears to have been the daily allowance for one man, differing probably for various kinds of grain.

CHERILUS. I. An Athenian tragic poet, contemporary with Thespis and Æschylus, and perhaps also with Sophocles. He first competed for the tragic prize in 523 B. C., and was still highly esteemed as an author in 483. He carried off the tragic prize 13 times, and is said to have composed 150 tragedies, besides other works, all now lost. **II.** A Greek epic poet of Samos, who flourished in the 5th century B. C. He was a friend of Herodotus. A few fragments only are preserved of his poems.

CHOL. See **KHOI**.

CHOIN. I. Marie Émilie Joly de, a French noble woman, born in Bourg, died in 1744. Introduced by the princess de Conti at the court of Louis XIV., his son, the dauphin, is said to have secretly married her, after which she was treated with the same regard which was paid to Mme. de Maintenon, the king eventually inviting her to reside near his court at Versailles, but she preferred to remain at Meudon. After the death of the dauphin she lived in great retirement, and was respected for her dignity and virtues. **II.** Louis Albert Joly de, a French prelate, born in Bourg, Jan. 22, 1702, died April 16, 1759. In 1730 he became bishop of Toulon, and acquired renown by the simplicity and purity of his life, by his charitable works, and by his *Instruction sur le rituel* (3 vols., Lyons, 1778; new ed. by Cardinal Gousset, 6 vols., Besançon, 1828), which is noted for the fulness of its information on ecclesiastical subjects.

CHOISEUL. I. Étienne François, duke de, a French statesman, born June 28, 1719, died in Paris, May 8, 1785. He was educated at a Jesuit college, and entered the army, being at first known as count de Stainville, and attained the rank of lieutenant general. Mme. de Pompadour procured for him the embassy to Rome, and afterward to Vienna, and finally in 1758 the department of foreign affairs. A little after he was created duke and peer; in 1761 he was placed at the head of the war department, transmitting his former office to his cousin the duke de Praslin, and also presided over the navy. In 1766 he resumed his functions as minister of foreign affairs. He signalized his administration by many useful reforms in the army and navy. To prepare against the attacks of England, Choiseul concluded the treaty known as the family compact, by which all branches of the Bourbons were united to resist foreign aggression. He also published in 1764 the famous edict for the suppression of the Jesuits in France. When Mme. de Pompadour died, he could easily have preserved his office by courting the favor of her successor, Mme. du Barry; but he treated her with such con-

tempt that he was dismissed and banished to his estate at Chanteloup. The regard in which he was held followed him to his place of exile, and his friends resorted thither to pay their respects to the fallen minister. He had endeavored, but in vain, to prevent the partition of Poland, and when the event took place Louis XV. said, "This would not have been if Choiseul had been minister." He died childless, and notwithstanding his income from his offices, and the large fortune brought him by his wife, the daughter of the wealthy financier Crozat, he was in debt to such an amount that all his estates were barely sufficient to satisfy his creditors.

II. Claude Antoine Gabriel, duke de, a peer of France, nephew and protégé of the preceding, born in 1762, died in Paris, Dec. 2, 1838. As colonel of dragoons, in 1791, he was active in preparing the flight of Louis XVI. and the royal family. On the failure of this attempt he was arrested, but recovered his liberty by the amnesty granted on the acceptance of the constitution by the king. Appointed first gentleman usher to the queen, he attended her until her imprisonment, and left France only when a price was set upon his head. Raising a regiment of hussars, he joined the royalist army, was taken prisoner, escaped, embarked for India, was wrecked on the coast of France, arrested and sentenced to death by the directory, but saved by the revolution of the 18th Brumaire. He kept aloof from public life during the reign of Napoleon, but on the restoration he was appointed a member of the new chamber of peers. He refused to sentence Ney to death, pleaded for Gen. Merlin, implicated in a conspiracy, resigned on the advent of the Villèle ministry, in 1820, the rank of major general of the national guard, and when the revolution of 1830 broke out, he was without his knowledge nominated, with Gérard and Lafayette, a member of the provisional government. He was afterward appointed aide-de-camp to Louis Philippe.

CHOISEUL-GOUFFIER, Marie Gabriel Florent Auguste, count de, a French classical scholar, born in Paris, Sept. 27, 1752, died June 20, 1817. He studied under the direction of Barthélemy, travelled several years in Greece, and in 1782 published the first volume of his *Voyage pittoresque en Grèce*. He was then made ambassador at Constantinople. On the outbreak of the revolution he adhered to the king, and was proscribed by the revolutionary government. He retired to Russia, where he was intrusted with the direction of the academy of fine arts and the imperial libraries. In 1802 he returned to France. The second part of his great work was published in 1809; the last part did not appear till after his death, in 1824.

CHOISY, François Timoléon de, a French writer, born in Paris in 1644, died Oct. 2, 1724. His delicate appearance induced his mother to dress him in feminine attire; he continued to wear it for many years, and was in the early part of his life notorious for his dissolute habits. In

1676 he accompanied the cardinal de Bouillon to Rome to attend the election of Pope Innocent XI. In 1685 he went on a mission to the king of Siam, of which he has given an interesting account. On his return to France he devoted his whole time to literary pursuits, was elected to the academy in 1687, wrote the history of several French kings, and attempted to present the annals of the church in a more accessible form than the learned Fleury. His *Mémoires pour servir à l'histoire de Louis XIV.*, which have been printed in Michaud's *Collection de mémoires*, and his *Journal du voyage de Siam fait en 1685 et 1686*, are written in a lively and agreeable style.

CHOKO DAMP, the name given by miners to the irrespirable gas (carbonic acid) which fills the mine after an explosion of fire damp. This gas is also found in badly ventilated parts of mines, its presence being detected by the difficulty of making candles burn, and the violent headaches it brings upon those who remain for any time where it is abundant. When carbonic oxide is present, the gas is exceedingly dangerous to breathe for an instant; but one may sometimes stay with safety for a minute or two in an atmosphere of choke damp in which a candle cannot be lighted.

CHOLERA, a term used to designate a variety of diseases characterized by profuse discharges from the stomach and bowels upward, but more especially downward, and in their extreme stages by cramps, absence of the pulse, coldness and blueness of the skin, and suppression of urine. The name has generally but erroneously been derived from Gr. *χολή* and *ρέα*, signifying a flow of bile; but it properly and more appropriately comes from *χολέρα*, a rain-gutter, as marking the fluidity, rapidity, and copiousness with which the discharges take place. The principal varieties are: 1. Cholera morbus, or that induced by the use of indigestible food, unripe fruits, spoiled meats, mouldy or corrupt provisions, blighted grain, cucumbers, melons, fat pork, stale crabs, lobsters, shell fish, incompletely fermented or sour liquors, bad drinking water, &c. The indications are to empty the stomach and bowels of the offending substances, and then to give an anodyne. 2. Catarrhal or serous cholera, produced by sudden check of perspiration, exposure to cold while heated, &c. The indication is to reproduce heat of the skin by warm clothing, warm drinks, &c. 3. Bilious or common cholera, produced in hot weather and by gross and luxurious feeding, &c. The indications are to evacuate the excessive and unhealthy bile, and then check its further secretion. 4. Anabillious cholera, in which the biliary secretion is much diminished or entirely suspended, or else is of a very light color, dirty white, almost colorless, or milky, and when abundant resembling the rice water evacuation of epidemic cholera. The indication is to restore the healthy secretion of bile. 5. Cholera infantum, a disease of warm sea-

sons, commencing with the first heats of summer, affecting almost exclusively infants and children in large towns and cities, prevailing in the parts most densely populated, and being most virulent in crowded courts and alleys, where the ventilation is very imperfect and the inhabitants most unclean. In fact it arises from a combination of hot weather and the impure air of cities, aided largely by bad food and poor milk. It somewhat approaches septic cholera in its nature. 6. Septic cholera, arising from the inhalation of air charged with organic impurities springing from decomposing vegetable and animal matter, sewer gases, and night soil. 7. True Asiatic cholera, a virulent form of septic cholera, always originating in Hindostan, and which, like the contagious forms of influenza, dysentery, or erysipelas, has become portable, communicable, and capable of reproducing itself in every body in which it gets lodgment. Hippocrates, 400 B. C., makes remarks about cholera which scarcely allow us to doubt of the conveyance of the Asiatic disease to Greece in that early period. Aretaeus of Cappadocia, A. D. 50, gives a correct description of it, even describing the spasms, coldness of the body, loss of voice, and suppression of urine. Galen in A. D. 131, and Cælius Aurelianus in 151, did the same; also Orabasius of Pergamus (230); while Alexander of Tralles (525) speaks of the watery evacuations, suppression of pulse and urine, followed in some cases by secondary typhoid fever, or death in a few hours.—When the French and English struggled for the Coromandel coast of India, repeated epidemics were noticed near Madras and Pondicherry, in connection with the great Hindoo pilgrimages. The year 1756 marks the recognition of periodically returning 12-yearly epidemics, connected with the great 12-yearly Hindoo festivals at the great temples. The great 12-yearly epidemics of 1756, 1768, and 1781 have been well described by Paisley, Girdlestone, Curtis, Sonnerat, Fra Bartolomeo, Papin, Davis, and others. On March 22, 1781, 5,000 English troops under Col. Pearse, marching near Ganjam, not far from the great temple of Juggernaut, and very shortly after the huge 12-yearly festival had taken place, were attacked by the disease very suddenly and with inconceivable fury, after camping on foul pilgrim grounds and drinking polluted water. Men previously healthy dropped down by dozens, and those less severely affected were generally past recovery in 24 hours. Besides those who had died there were 500 on the sick list on the first day, and in two days more nearly 3,000 were affected. This epidemic was carried by returning pilgrims up to Calcutta and down to Madras. Three times 12 or 36 years subsequently the great historical epidemic of 1817 occurred; this proceeded up the Ganges as far as Allahabad, when it was deflected southward to the province of Bundelund, in which the marquis of Hastings was carrying on war

against the Mahrattas with 90,000 men. Of the natives 10,000 had already died in Allahabad, and many others had joined the army as camp followers, among whom the disease crept about in its usual insidious manner for several days, until a sufficient number of foci of the disease had been developed for it to burst forth with irresistible fury in every direction. The natives deserted in great numbers, and the highways and fields for many miles around were strewed with the bodies of those who had fled with the disease upon them. The encampments and lines of march of the army presented most deplorable spectacles; hundreds of soldiers dropped down in every day's advance, and on every night's halt; so that the whole presented the appearance of successive battle fields and the track of an army retreating under every circumstance of defeat and discomfiture. In two weeks 9,000 men succumbed to the pestilence. A subsidiary force coming up from the south under Col. Adams to cooperate with the marquis of Hastings afforded the second striking instance of a large body of men in high health coming into the pestilential region and falling at once into a wretched state of sickness; 70 cases and 20 deaths occurred on the first day, and many were attacked while loitering for water at contaminated springs and rivulets. Other reinforcements were advancing from Bombay in the southwest, and the course of the disease had long been so regular along the line of much travelled roads and the marches of troops that the Bombay authorities prepared for it when it was many hundreds of miles off. Step by step the disease could be traced marching from town to town and creeping from village to village, by the arrival of persons affected with the disease from places where it was known to prevail. From Bombay it was carried up the Persian gulf to Bushire, the only port of southern Persia, from which it was transported by travellers to Shiraz; was excluded from Ispahan by a rigid quarantine, and deflected east to Yezd; from there north to Teheran, and from thence to Reshd, the principal Persian port on the Caspian sea; and from there both by land and water up to Astrakhan, at the mouth of the Volga, where the disease died out. From Bombay it was also carried up to Bassorah at the head of the Persian gulf, where 18,000 persons died in 18 days; and from there along the rivers Euphrates and Tigris to Bagdad, Damascus, Aleppo, and the Mediterranean coast, where it also faded away in 1821. Every successive epidemic of cholera has always been carried up the Persian gulf from Bombay, Surat, Kurrachee, and other ports on the western coast of India, and thus reached the Mediterranean, Black, and Caspian seas, and neighboring countries, by the so-called Persian gulf route. In the Bombay presidency there are 94 shrines to which large pilgrimages are made, and from which the disease is brought to the seacoast. In India the epidemic of 1817

spread in every direction with the march of armies, pilgrims, merchants, and travellers, often in the face of contrary winds and monsoons, although the speed of its progress was accelerated by favoring winds which forced along vessels containing the disease. It was conveyed south in ships to Ceylon, and southwest to Mauritius, and over to Zanzibar on the east coast of Africa, and from there up to Muscat at the foot of the Persian gulf, in slave ships, and down again southeast to Bombay. It was also carried east to Burmah, Siam, Malacca, Sumatra, Java, Borneo, the Philippine islands, and northeast to Canton in China by ships. This epidemic and that of 1781 were distinctly Juggernaut-pilgrim choleras, and for years after we have a repetition of the old story: "Cholera in Calcutta; the pilgrims at Juggernaut suffering severely."—In 1826 the first indications of another pestilence appeared in the north of India; epidemic cholera broke out at Hurdwar, the great place of pilgrimage at the source of the Ganges, where it first issues from the foot of the Himalaya mountains. A few hundred thousand pilgrims go to Hurdwar every year; more every third year; still more every sixth and ninth years, and fully 3,000,000 assemble every 12th year, and a vaster number every 60th year. From Hurdwar cholera was carried back by the huge caravans which came down to the festival from central Asia, Persia, and Afghanistan, to Cabool. Then the disease advanced over the great northwest central Asiatic caravan route to Balkh, Bokhara, and Khiva, and to Orenburg in Russia; also from Cabool by the north Persian route due west to Herat, Meshed, Teheran, and Reshd, at the foot of the Caspian sea; and from there up to Astrakhan in Russia, both by sea and land. Cholera reached Orenburg on Aug. 26, 1829, and Astrakhan in September. From Orenburg it proceeded due west to Nijni Novgorod and Moscow; and from Astrakhan it advanced step by step up the Volga toward the same places, until the stream which had flowed through central Asia to western Russia and Orenburg formed a junction with that which entered southern Russia from the northern provinces of Persia. From Moscow the disease was distributed all over northern and western Russia, especially to Riga, on the Baltic, from which 60 or 70 English coal vessels fled in haste, carrying the disease to Sunderland and Newcastle in England. At this time the great Polish revolution of 1830-'31 was going on, and Russian troops carried the disease to Warsaw, whence it was conveyed due west to Posen and Berlin, and from there to Hamburg and over to London. After the pestilence had prevailed in England, Ireland, and Scotland, it was carried by 10 or 12 Irish emigrant ships to Quebec in the spring of 1832, and from there up the St. Lawrence and across the lakes to Detroit, where it met the United States troops going to the Black Hawk war. In a short time the whole force sent by way of

the lakes was rendered incapable of taking the field; some were left behind, but the greater part reached Chicago in a most deplorable condition; one company which had been mustered and inspected 14 days before without a man on the sick list, had dropped 47 men out of 78 in that short time; and one regiment lost over 200 men in a week. It was generally believed that the infection was contracted by the soldiers on the steamboats which had been previously engaged in transporting crowds of emigrants westward from Montreal and Quebec; and the army surgeons agreed in asserting that previous to the arrival of these steamboats not a case had been observed in Chicago. It was distributed to all the national posts and forts in the extreme west, especially to Fort Dearborn at Chicago, Fort Crawford near Prairie du Chien, and Fort Armstrong at Rock Island. From there the pestilence was carried down the Mississippi to New Orleans by October, 1832; and Surgeon General Lawson says, "One fact is certain: no case of cholera occurred in New Orleans until after the arrival of steamboats with cases of cholera on board, and after a number of their passengers had died of it; 6,000 died out of a population of 55,000."—The next great 12-yearly epidemic commenced in lower Bengal in 1841, advanced over India and toward the N. W. provinces; was supplemented by a Hurdwar epidemic in 1843, and was found in Afghanistan in 1844, in Persia and Meshed in 1845, advancing west in 1846 to Teheran, and up between the Black and Caspian seas toward southern Russia, reaching Astrakhan July 30, 1847. But especially it was deflected west to Trebizond and Poti, on the southern and eastern coasts of the Black sea, and from there carried over to Constantinople and Odessa, and up the Danube to Germany, whence it was carried to Holland and England. Toward the close of the year 1848 numbers of German emigrants arrived at Havre, and some of them were carried to New Orleans on the ship Swanton, with 13 deaths from cholera before arrival, and from which six cases were sent on shore. Dr. Fenner says, after the disease had once commenced in New Orleans, almost every vessel and steamer leaving that city had 20 or 30 cases on board; and thus persons having cholera and dying with it were carried to all the landing towns and cities up the Mississippi and Ohio rivers as high up as Cincinnati. From St. Louis it was carried over the emigrant route to San Francisco; more than 1,000 emigrants died on the road, and many Indians who loitered along from curiosity and for the purpose of begging paid a terrible penalty. In the mean while the Austrian, Hungarian, and Russian armies contending in Hungary in the spring and summer of 1849 had become the principal centre and focus of the disease, whence it spread with terrible virulence into Poland and Germany.—The next and last great 12-yearly epidemic commenced in India in April, 1865. By means of railroads and steamboats,

it reached Mecca on the Red sea by May 2; in Alexandria, June 2, cases were frequent; from there it was carried by steamships to Smyrna, Constantinople, and up the Black sea; to Malta, Ancona in Italy; to Marseilles, Gibraltar, Barcelona, Algiers, Tunis; and to Southampton in England by the steamship Poona by July 10, with 120 cases of cholera by July 24. But more especially the disease was conveyed up through France from Marseilles to Paris and Havre; and emigrant ships quickly transported the disease over to America, principally to New York. From New York it was distributed in 1866 in every direction over the United States, by railroads and steamboats, even as far west as the Smoky Fork river in Kansas; to Forts Riley and Harker, and to the new town of Ellsworth, then only six weeks old, because soldiers, railroad laborers, and others from infected districts brought the disease to the new line of railroad then building.—Thus we have sketched the great route lines of cholera and the great 12-yearly epidemics. The next one, if our theory is correct, will be a Juggernaut one in 1877, supplemented by a Hurdwar cholera in 1879; although the constant intercourse of Russia with central Asia, and her expeditions in Turkistan, may be the means of introducing a lesser epidemic into Europe, as they are doing at the present time. But in 1877 and 1879 we may expect an outburst of the disease, such as there was in 1781 and 1783, 1817 and 1819, 1829 and 1831, 1841 and 1843, 1853 and 1855, and 1865 and 1867. As Hindostan, in which cholera always originates, lies to the east and south of Europe and North America, the prevailing direction in which the disease always advances is to the west and north; but as it always proceeds along the lines of the greatest and most rapid travel, it often doubles back upon itself. Thus in 1832 it was carried south from England to Holland and France, down to Marseilles; east to Italy, up toward Vienna, and south to Malta toward Alexandria; also down to Spain and back through the Mediterranean. In 1841 and 1842 it was carried by English troops from India to China, back toward Burmah, central Asia, and Bokhara, south into Hindostan as far as the mouth of the Indus, and low down the Ganges. In the Crimean war it was carried east from France and Algiers to Turkey. In 1865 it was taken from Alexandria to Constantinople, from there across the Black sea to Trebizond, Circassia, and Armenia, toward Persia. In our next contests with the disease our whole safety lies in quarantine and thorough disinfection. Bokhara, the holy city of central Asia; Meshed, the holy city of Persia; Mecca, the holy city of Arabia; and the huge pilgrimages to and from them, are the great outposts of danger. Next come the great distributing ports of Alexandria, Trebizond, Poti, Astrakhan, and Orenburg; next Constantinople, Odessa, and the Baltic ports; next Marseilles, Havre, and Liverpool; finally

our Atlantic ports. The disease can be stopped at any one of these outlets and inlets. It has never yet been carried across the Pacific; but with the vast increase of our Pacific commerce with China and Japan, it must sooner or later reach California from that direction.—As all the most virulent epidemics, from Hurdwar to London, have been connected with the contamination of drinking water by cholera evacuations, there is but little danger of a very extensive outbreak of the disease in any city where the drinking water is originally pure and is conveyed in close and clean pipes. Water sources must be zealously guarded; and it should be regarded as a penal offence, always to be followed by prompt and severe punishment, to foul the tributaries of a stream furnishing drinking water to any community. Cholera pollution of wells, springs, fountains, pumps, and small streams is only too common in all parts of the world, and is the most productive source of severe local outbreaks of the disease, and may always be suspected in every instance in which many cases occur simultaneously in one house, family, or neighborhood. There is even reason to believe that pure drinking water may become contaminated if left standing long in cholera wards, in open vessels; at least, a substance as virulent as croton oil has been condensed from the atmosphere of close and crowded cholera rooms. The ingestion of this water is vastly more fatal than the use of bad fruits or poor liquors; but its dangers may generally be prevented by simple boiling, or filtering through charcoal, or by adding a few grains of permanganate of potash. With these precautions cholera patients may be attended with great safety, provided the nurses be kept scrupulously clean, and no cups, plates, or drinking vessels be touched with soiled hands. Dust inhaled from cholera-soiled clothes, carpets, or floors is the next most dangerous substance; but the effect of this is confined to single rooms, houses, families, and confined spaces, and can never rise to the dignity of the cause of a great and extended epidemic. As the poison of the disease always proceeds from the cholera evacuations, these should be disinfected instantly and thoroughly; and common salt is perhaps as good a disinfectant as any. Strong solutions of salt, or weaker ones of sulphate of iron (copperas) or sulphate of zinc (white vitriol), 1 part to 10 of water, should be kept in the bed pans or vessels; soiled bed and body clothes should be put, before removal from the sick room, into a disinfecting solution of salt, chloride of soda, weak carbolic acid, permanganate of potash, or chloralum, and then subjected to careful washing out of doors. The floor of the sick room should always be bare of carpets, and may be sprinkled or washed with a strong solution of salt or chloralum, or the chloride of aluminum, all of which possess several advantages. They are not poisonous, are inodorous, and are very cheap. They prevent decomposition and re-

move the fetor of most animal discharges, either natural or the products of disease. They deodorize sewage, and may be used for the disinfection of rooms, and as a cleansing material for floors or furniture (2½ ounces to a gallon of water). But, not being volatile, they must be aided by aerial and diffusible disinfectants, the best of which are chlorine, iodine, and carbolic acid. The unpleasant odor of chloride of lime or soda may be overcome by the addition of a small quantity of nitro-benzole. Iodine placed in saucers in different parts of the sick room evaporates spontaneously; and if its odor can be detected, it is in sufficient quantity to disinfect the air. Or ½ lb. of carbolic acid may be mixed with 10 lbs. of wet sand, placed in shallow vessels in various parts of the room, and renewed when its odor has disappeared. It will be seen that the attempt to obtain a disinfectant of universal application, and capable of fulfilling every indication, will always be attended with disappointment. Some, like the chloride of soda and the sulphates of iron and zinc, prevent fermentation and putrefaction; others, like iodine, chlorine, and carbolic acid, resolve the products of decay and decomposition into harmless substances.—Although the first stage of cholera cannot be distinguished from a profuse watery diarrhoea, the treatment is very simple. In the first place, it should be fully believed that nine tenths of all cases of diarrhoea occurring in the summer season, even in cholera times, are not Asiatic cholera, and never will be. Even if the case be one of cholera, absolute repose in bed, between thin blankets, will cure at least one half of all cases without any medicine; then one or two grains of sulphate of iron, with or without a quarter or half a grain of opium, every two or four hours, will cure a great many more. In the severest and most neglected cases no treatment is of any avail; but from 5 to 20 per cent. of these will recover if not too much interfered with. The preventive measures are equally simple. As drinking cholera water is almost the only cause, a rather free use of salt and vinegar, which are the great domestic disinfectants, may be all that is essential. It is certainly unnecessary to abstain from ripe and good fruits and vegetables, while all sweet, fresh meats and farinaceous substances are beneficial. Even of those persons who swallow water into which cholera dejecta have found their way, all with healthy stomachs, containing healthy acid gastric juice, and food in the process of normal digestion, will escape. In some instances 15 out of 20 have escaped. But if cholera water be swallowed on an empty stomach some hours after taking food, then the cholera poison will set up its distinctive changes in the epithelium of the stomach, which speedily extend to that of the intestines, so that a robust, healthy, and otherwise prudent person may quickly succumb to the disease. Or, if more of such water be

swallowed, some of it will at once pass to the small intestines, and their contents being alkaline, the specific action of cholera matter will at once take place. Hence persons with weak digestion, and those suffering from depression of the nervous force, whether following excessive fatigue or a debauch, are especially apt to be attacked. Therefore the poor of large towns, who are ill fed and suffer from want of a healthy acid secretion from the gastric walls, are especially liable to the disease. Hard drinkers increase their risk by drinking large quantities of water after a debauch, to quench their unnatural thirst. But even all these will escape if they be fortunate enough not to drink foul cholera water.—The pathology of the disease is equally simple. The cholera poison first produces a paralysis of the vaso-motor nerves and capillaries of the stomach and bowels, allowing the watery particles of the blood to exude as if from a relaxed and sweating skin. Next, the epithelium of the gastro-intestinal mucous membrane is shed in large quantities, leaving the latter bare and almost raw, red, and filled with blood. In this stage strong stimulants and irritants are very injurious, while a few teaspoonfuls of arrowroot with a little brandy, given very frequently, will prove quite beneficial; and sweet oil and lime water is far better than castor oil, or other so-called eliminatives. As the disease advances the blood is drained of much of its serum or water, becomes thick, and stagnates in various places. It is no longer properly oxygenated, and becomes dark, marking the third stage of the disease, followed by exhaustion and perfect collapse; from which a small number may slowly rally, if carefully supplied with drink and weak stimulants in small quantities, frequently repeated. Of these, some will pass into a typhoid state, through retention of effete materials in the blood, especially of urea, from complete inaction of the kidneys. Then diuretics, more particularly nitre, cantharides, digitalis, or nuxvomica, will save a small proportion. The great point in the whole course of the disease is not to be too hurried or agitated, nor too anxious to do too much and too quickly. Absolute rest and warmth, the careful use of food and weak stimulants, aided by small quantities of astringents and opiates; especially vinegar of opium, with an absence of all unmanly haste and fear, will save a large number who would fruitlessly rely upon vaunted specifics. Dr. Macpherson, who had seen and treated thousands of cases, when attacked himself at night, remained quietly in bed, took nothing but a little arrowroot and brandy with a few drops of laudanum, and occasional sips of carbonic acid water. In the morning he directed that an old and experienced medical friend should not be sent for until after he had finished his breakfast, and the usual time for going on his rounds had arrived. With these simple means, and the careful handling of an old and tried hospi-

tal steward, he was saved when on the borders of a profound collapse, and slowly and steadily brought back to life. All three of these wise and patient men were convinced that the more there was of haste, the more profusely food, stimulants, and drugs were plied, the more certainly fatal would be the result; and that the more steadily and quickly their few and simple means were used, the greater would be the chances of recovery. When he was cold and almost pulseless, and so exhausted as scarcely to be able to raise a finger or move his head, his courage did not fail him; and his skilled and wise attendants did not kill him with mistaken zeal and kindness.

CHOLESTERINE (Gr. *χολή*, bile, and *στερεός*, firm, solid), or **Biliary Fat**, a non-nitrogenized organic substance, found in the bile and in other fluids or situations in the human body, or that of animals in which the biliary secretion is prominent, this substance when separately obtained having the appearance of spermaceti, and differing from ordinary fats only in the fact that it refuses to form a soap with caustic alkalies, even under the action of prolonged heat. Cholesteroline is neutral, inodorous, insoluble in water, soluble in ether and hot alcohol. Its composition is usually represented by the formula $C_{25}H_{42}O$. It is combustible and burns with a bright flame. It crystallizes in very thin, colorless, transparent, rhomboidal plates, frequently marked by a cleavage at one corner in a line parallel with the corresponding side, and often forming in layers, the borders of the subjacent plates showing very distinctly through those above. Cholesteroline was discovered in 1782, by Poulletier de la Salle, in biliary calculi; its presence in the blood was shown in 1830 by Denis. In a condition of health, cholesteroline exists in the bile, blood, liver, brain and nerves, and the crystalline lens. It is also found in very large quantity in the meconium, in the feces of animals hibernating, and by some authorities it is said also in the feces generally in health. It occurs frequently as a morbid deposit or product. Biliary calculi consist wholly of cholesteroline, coloring matter, and mucus. The tablets of cholesteroline are found in or obtained from cancerous growths, encysted tumors, and atheromatous deposits in the coats of the arteries, and sometimes as forming distinct deposits or tumors in the substance of the brain. Cholesteroline is obtained also from the fluid of hydrocele, of ovarian cysts, of tubercle in the crude state, and from pus. Its quantity in the normal fluids is small, forming, according to Berzelius, 1 part in 1,000 of the bile in man, and according to Prof. Austin Flint, jr., of New York, only .618 in 1,000. The analyses of the latter give as the proportion in 1,000 parts, for the venous blood of the male, .445 to .751; for the meconium, 6.245; for the human brain (in two instances in which death was sudden), 7.729 to 11.456. The bile and some other fluids can hold the cholesteroline in

solution, though by aid of what other constituent is not known; while it may perhaps exist, in organic union with other components, in the nervous substance and the crystalline lens. While the chemical relations of cholesteroline had been fully studied, its physiological relations long remained in doubt, or the subject at the most of conjecture. According to the researches of Prof. Flint, cholesteroline is constantly forming in the system, being always present in the nervous matter and the blood, but by far the most abundant in the former; it is a necessary product of the waste of the nervous matter, and being removed thence in the circulation constitutes one of the most important of the materials to be excreted from the body. It is separated from the blood by the liver, appears constantly in the bile, and in this is poured into the alimentary canal. As in the case of urea, the most important excreted matter of the kidneys, so with cholesteroline, if its separation and removal through the liver ceases, or is not in due amount, this product accumulates in the system, producing its form also of poisoning or deterioration of the blood, and leading to a corresponding class of diseases. Thus the bile has two distinct functions answering to the presence of two entirely distinct components in it. One of these embraces the glyco-cholate and tauro-cholate of soda, which do not preëxist in the blood, and so do not accumulate in it when the liver is torpid or its action arrested; these are produced in the liver, serve a useful purpose in completing the process of digestion, are not discharged in the feces, and constitute a secretion only. The other function of the liver is the depuration of the blood by freeing it of excess of cholesteroline; and to this end probably it is that secretion of bile continues in the intervals of digestion, though more abundant during the digestive acts. The ordinary feces, according to Prof. Flint, do not contain cholesteroline, but contain stercorine; the substance thus named by the author being invariably found by him in the normal feces, and regarded by him as identical with that previously found in minute quantity (.02 to .025 part in 1,000) in blood, and named seroline. The transformation of cholesteroline to stercorine occurs during the digestive process; and that it does not take place before digestion commences, nor when it is for the time arrested, accounts for the presence of the former only in the meconium and the excrement of animals hibernating. Stercorine is therefore the form in which cholesteroline is discharged from the body. The facts explain the distinction of the two types of jaundice. In the mild type the bile is formed, but its discharge being obstructed, its coloring matter chiefly is reabsorbed, and the disease is attended with yellowness of the skin, but is comparatively harmless; in the other, the grave symptoms and almost invariably fatal character are due to cessation of the action of the liver, with retention of choleste-

rine in the system. There is also a condition of the blood, which may or may not be attended with jaundice, due to a gradual and undue accumulation of cholesterine in that fluid, and to which Prof. Flint applies the name "cholesteramia." This can only occur when, through some organic or structural change in the liver, and not merely of a small part, but of so much of it that the remaining healthy portion, if any, is insufficient for the depuration of the blood, the organ is in consequence incapable of performing duly its excretory office.

CHOLET, or **Chollet**, a town of France, department of Maine-et-Loire, on the Maine, 30 m. S. S. W. of Angers; pop. in 1866, 13,360. It is largely engaged in manufactures, having establishments for the spinning of cotton and woollen goods, known as *toiles de Cholet*, or *cholettes*, paper mills, bleacheries, tanneries, and dye houses. It suffered greatly from civil war during the revolution, its manufactures being destroyed, and the workmen put to death or dispersed. Since then it has been entirely rebuilt. A number of battles were fought here in 1792-'4 between the republicans and the Vendéans, in most of which the latter were defeated.

CHOLULA, a decayed town of Mexico, situated on the tableland of Anahuac, 6,912 ft. above the sea, in the state and 5 m. W. N. W. of the city of Puebla; pop. 10,000, wholly Indians. It was formerly the capital of an independent state of the same name, but is now little more than a village rapidly sinking into insignificance.

It has still some manufactures of coarse cotton goods, and is surrounded by well tilled gardens and plantations of corn and maguey. In its neighborhood stands the largest of the *teocallis* or pyramids of Mexico, consisting of an artificial, or as some travellers have supposed a natural hill, cased with layers of adobe, stone, and plaster, and forming a truncated pyramid of four equal sides, facing the cardinal points and divided into the same number of terraces. According to Humboldt's measurement, it is about 160 ft. in perpendicular height, 1,400 ft. square at the base, and covers an area of 45 acres. Latrobe states its elevation to be 177 ft. and the length of its base 1,425 ft. It is accessible on all sides, though time has destroyed the regularity of its outline, and covered its sides with trees and shrubs to the very summit. The platform on its top is more than an acre in extent, and is surrounded by a parapet. In its centre stands a chapel to the Vir-

gin, erected by the Spaniards, where masses are celebrated. A part of this pyramid has been laid open by the construction of a road across it, when a cavity was disclosed containing a number of vases, idols in basalt, and two skeletons. It was built in honor of the deity Quetzalcoatl, but its precise age is unknown. The Aztecs found it here when they settled in Anahuac. Close by are two smaller pyramids.—When the ancient empire of Mexico was in its glory, Cholula was the emporium of the plain, the seat of skilful manufactures, and a holy city where each race had its temples and sacrifices, and whither pilgrims resorted from the most distant quarters. Its streets were gay with the pomp of frequent festivals and processions, while on the summit of the great pyramid rose perpetual flames from the temple of Quetzalcoatl. This temple, a magnificent structure, and an object of profound national reverence, contained an image of the



Teocalli of Cholula.

god, wearing about his neck a golden collar, in his ears pendants of turquoise, and on his head a mitre with plumes. He bore a shield covered with emblems, and held in one hand a jewelled sceptre. It is related that at this and the numerous other shrines throughout the city 6,000 human beings were sacrificed every year. Cortes, who stopped at Cholula on his march to Mexico, described it as a beautiful and well fortified town, containing about 20,000 houses, besides which the suburbs were computed to embrace about as many more. He called it Churultecal. He was received by the inhabitants with apparent kindness, but learning that they were plotting against him he fell upon them unexpectedly, and gave the city up for several hours to massacre and pillage. In his letter to Charles V. he rates the loss of life at 3,000; but most accounts say 6,000.

CHOMEL, *Auguste François*, a French physician, born April 13, 1788, died in Paris, April 10,

1858. Under the instruction of Boyer, Corvisart, and Pinel, he made rapid progress in his studies, and at an early age was attached to the medical service of the hospitals in Paris. In 1813 he published an *Essai sur les rhumatismes*; in 1817, *Éléments de pathologie générale*; in 1821, *Traité des fièvres et des maladies pestilentielles*, which was attacked by Broussais, but which has outlived Broussais's theory, and made a reputation for the author. In 1827 Chomel was appointed professor of medicine at the faculty of Paris, as successor to the celebrated Laennec, whose views he held and taught in the same chair. His practice became more lucrative than that of any other physician in France. Genest, Requin, and Sestier published their notes of his clinical lectures on typhoid fevers, rheumatisms, and pneumonia (3 vols. 8vo, 1836), which are still deemed standard works in France.

CHONTALES, a district of Nicaragua, N. E. of Lakes Nicaragua and Managua, separated from Honduras by the district of Segovia. The chain of the Cordilleras called the Alto Grande mountains traverses the district in a N. W. and S. E. direction, making up the greater part of it. The mining region, which gives the principal importance to this portion of Nicaragua, lies along the slopes of the mountains, and in this are several towns, mostly occupied by the native Indians. One of the most important of these is Libertad, 35 m. N. E. of Lake Nicaragua. The gold mines in its vicinity, on the rivers Mica and Bola, branches of the Bluefields, were worked by the early Spanish settlers, and are still worked by the Indians. The gold appears to be obtained from decomposed auriferous slates, which are ground by arrastres. In the same region are found veins of silver ores. Near Lake Nicaragua a bed of coal has been opened, which is probably of the nature of the tertiary coals of South America. Among the mountains are vast plains covered with grass, which gives support to immense herds of cattle and horses. Much good timber is found in the vicinity of the mines, among which are species of oak and pine. Fruits of the tropics grow abundantly in close proximity to those of the temperate zones, and the articles necessary for subsistence are easily obtained in the greatest abundance. The district is easily accessible from the lakes.

CHOPIN, Frédéric François, a Polish pianist and composer, born at Zelazowa-Wola, near Warsaw, Feb. 8, 1810, died in Paris, Oct. 17, 1849. His father was French, his mother Polish. His education in music was begun at the age of nine, and was for seven years conducted by Ziwny, and subsequently by Elsner. Prince Anton Radziwill was his patron, and introduced him into the best society in Warsaw. He made several journeys to Germany to study the masterpieces of his art, and was at Vienna when the Polish revolution of 1830 broke out. Here he gave several concerts, but the public was absorbed in politics, and his success was

not great. He set out for London, but stopped at Paris, where he won immediate and brilliant fame as a composer, and performed in private concerts, but rarely appeared in public. For ten years previous to 1844 he gave only a single concert. In 1836 he formed an intimacy with Mme. Dudevant (George Sand). His health, always fragile, required a southern climate, and in 1837 they took up their residence in the island of Majorca, where she nursed him through a long and dangerous illness. The intimacy continued till 1847. In the spring of 1848 he made his long-projected visit to England, where he met with an enthusiastic reception. Contrary to his former habits, he entered much into society, and performed frequently at private concerts, but only three times in public, the last being at a concert for the benefit of the Poles. He returned to Paris utterly broken in health, and thenceforth incapable of any continuous labor. He had projected a book upon the theory and art of music; but only a few pages of it were written, and these were destroyed with all his unfinished works. As a composer Chopin ranks in the first class, although he produced no great continuous work. Liszt, his friend and admirer, gives an elaborate analysis of the character of his works: "We meet with beauties of a high order, expressions entirely new, and a harmonic tissue as original as erudite. In his compositions boldness is always justified; richness, even exuberance, never interferes with clearness. Daring, brilliant, and attractive, his works disguise their profundity under so much grace, their science under so many charms, that it is with difficulty we free ourselves sufficiently from their magical enthrallment to judge coldly of their theoretical value." This refers especially to the earlier compositions, "written in the commencement of his career, and characterized by a youthful vigor not to be found in some of his subsequent works, even when more elaborate, finished, and richer in combinations; a vigor which is entirely lost in his latest productions, marked by an over-excited sensibility, a morbid irritability, and giving painful intimations of his own state of suffering and exhaustion. His nocturnes, ballads, impromptus, and scherzos are full of refinements of harmony never heard before; bold, and of startling originality. His concertos and sonatas are beautiful indeed, but we may discern in them more effort than inspiration. Some of these efforts, however, are resplendent with a rare dignity of style; and passages of exceeding interest, beauty, and grandeur may be found among them." A complete list of the works of Chopin is given in Lowinski's *Musiciens polonais et slaves*. His life by Liszt, which is critical rather than biographical, has been translated by Martha Walker Cook (Philadelphia, 1863). His life has also been written by Barbedette (20th ed., 1869).

CHOPTANK RIVER rises in Kent co., Delaware, flows S. W. into Maryland, and near the

S. extremity of Talbot co. spreads into an estuary several miles wide and nearly 20 m. long, through which it flows into Chesapeake bay; total course, 100 m. It is navigable for sloops to the mouth of Tuckahoe river, a distance of about 50 m.

CHORAGUS (Gr. χορός, chorus, dance, and ἄγειν, to lead), a functionary among the ancient Athenians who paid the expenses attendant on the equipment and instruction of a chorus. Originally, the chorus in dramatic representations was selected from the citizens of the state; but, as music and dancing became more artistic, there arose the distinction between spectators and performers. Salaried artists were employed, and at length the entire superintendence of all the details of a theatrical representation was intrusted to a single individual, called the choragus, who was selected by the state, and upon whom rested all the expenses incurred in bringing out the show. Each of the ten tribes furnished a chorus of dancers and musicians, and chose a citizen to fulfil the duties of choragus. The person thus elected immediately assembled the performers, gave them an instructor, furnished them with costumes, and, during the time of their training, supported them at his own expense, providing them only with such food and drink as would strengthen or improve the voice. The choragi drew lots for the choice of teachers; for, as their credit depended upon the success of their chorus in the dramatic or lyrical contests, the selection of the instructor became a matter of great importance. The office of choragus was one of high dignity; for religion and art, and the rivalry between tribes and states, exalted the Athenian imagination; and the choragus who was adjudged to have exhibited the best entertainment received as a prize a tripod, which was ceremoniously consecrated in the temples, and on which was inscribed the name of the victorious choragus and of his tribe. There was a whole street at Athens formed by the line of these tripod temples. The term choragus came in time to signify a person who supplied the costs for any purpose.

CHOREA. See ST. VITUS'S DANCE.

CHORIS, Louis, a Russian painter and traveler, born of German parents at Yekaterinoslav, March 22, 1795, died at Jalapa, Mexico, March 22, 1828. He accompanied Biberstein to the Caucasus in 1813, and sketched the most beautiful plants of that region. In 1814 he joined Kotzebue in his voyage of circumnavigation. In 1819 he went to Paris, and engaged in the publication of the *Voyage pittoresque autour du monde* (Paris, 1821-'3), of which his drawings formed the most valuable part, the text being by Cuvier and Chamisso, with phrenological dissertations by Gall. His *Vues et paysages des régions équinoxiales* (Paris, 1826) was the complement of this work. He also studied historical painting in the studios of Gérard and Regnault, and assisted the former upon his "Consecration of

Charles X." Having undertaken a new exploration of Mexico and Central America with an Englishman named Henderson, he was murdered by highwaymen near Jalapa.

CHORLEY, a town of Lancashire, England, on the Cham, near its confluence with the Yarrow, 20 m. N. W. of Manchester; pop. in 1871, 19,824. It is situated on rising ground, is well built, and has been considerably improved within the present generation, an extensive system of sewerage having been in operation since 1857. The ancient parish church of St. Lawrence has been enlarged and renovated. There are numerous schools, a lyceum, and various educational and charitable institutions. A new cemetery, covering 13 acres, is provided with Gothic chapels for the use of Protestants and Roman Catholics. The population has risen from about 4,000 in 1801, owing to the remarkable progress of industry. Besides the staple manufactures of cotton fabrics, muslins, jacanets, fancy articles, and yarns, there are printing and bleaching, dyeing and chemical, boiler and engineering works, and iron and brass foundries. In the vicinity are mines of coal, lead, and iron, and quarries of slate and grit stone. Weekly markets are held on Tuesday, and annual fairs for cattle and horses, and for general purposes of trade. The Liverpool and Leeds canal passes within half a mile of the town, and is joined at a short distance by that from Lancaster and Preston.

CHORLEY, Henry Fothergill, an English musical critic and author, born near Billinge, Lancashire, Dec. 15, 1808, died in London, Feb. 16, 1872. In his boyhood he entered a mercantile establishment in Liverpool, but soon went to London to try a literary life. He had acquired a slight knowledge of music from Zengheer Hermann, the conductor of the Liverpool philharmonic society, and after a hard struggle attracted the notice of the editors of the "Athenæum," who gave him a position on that journal, of which he conducted the musical department for 35 years, with an honesty and candor never impeached even by those who differed with his judgment. When Gounod vainly sought a hearing in London, Chorley pleaded his merits so persistently that the composer was given a trial, and "Faust" met with a splendid success. During his long connection with the "Athenæum" Chorley found time to do much other literary work. Besides his books, he wrote a number of operatic librettos; among which were the "Amber Witch," for Wallace's music; the "May Queen," set by Sir Sterndale Bennett; "St. Cecilia," set by Sir Julius Benedict; "Kenilworth" and the "Sapphire Necklace," written for Arthur Sullivan; and "Faust" translated from and adapted to the music of the French score. His songs, which are numerous, all exhibit culture and refinement. In his translations he was generally remarkable for original treatment rather than fidelity. A short time before his death he nominally closed his connection with the "Athenæum," but continued to

write for it occasionally. His principal published works are: "Conti the Discarded, and other Tales" (3 vols., 1835); "Sketches of a Seaport Town," a novel (3 vols., 1835); "Memorials of Mrs. Hemans" (2 vols., 1836); "Lion, a Tale of the Coteries" (3 vols., 1839); "Music and Manners in France and Germany" (3 vols., 1841); "Pomfret, a Novel" (3 vols., 1845); "Criticisms on Modern German Music" (2 vols., 1854); and "Thirty Years' Musical Recollections" (2 vols., 1862).—Mr. Chorley's "Autobiography, Memoirs, and Letters," compiled by H. G. Hewlett, was published in 1873 (2 vols., London).

CHORON, Alexandre Étienne, a French musician and author, born at Caen, Oct. 21, 1771, died in Paris, June 29, 1834. He invented a system of notation in order to preserve the songs which he heard or composed. He afterward studied music under the best masters, but was equally interested in the physical sciences and mathematics. In 1794 he was appointed chief of brigade to the polytechnic school, where he passed several years. In 1815 he became director of the opera, which office he held for only 17 months. He founded in 1817 a musical school for children, which afterward took the name of *Institution royale de musique religieuse*. His most important work is his *Principes de composition des écoles d'Italie*. He left many others unfinished, among them a *Dictionnaire historique des musiciens*.

CHORUS (Gr. χορός), originally a dance in a ring, or round dance; then any dance accompanied by music, or choral dance. The chorus was an integral part of the Grecian drama, both tragic and comic, and was developed with it from its first rudiments in the religious processions in honor of Bacchus, with dithyrambic songs, dances, jokes, the wagon and sacred goat, through the improvements of Thespis (about 530 B. C.), who created a kind of stage, and introduced an actor reciting in monologues the deeds of the gods and heroes, and through those of Æschylus, who added another actor, shortened the songs and dances, and introduced the dialogue, down to the sublime creations of Sophocles and Euripides. The chorus, being of Doric origin, maintained its solemnity in form, and even in dialect. In its final state it was, in the tragedy, a group of persons of both sexes, the elders of the people, priests, counsellors of the king, matrons, captive virgins present as spectators at the scene of the action, representing to some extent in their lyrical utterance the emotions and thoughts of the audience. When the actors paused, the chorus sung or spoke, accompanied by solemn music, sometimes only through their leader, called the coryphæus, sometimes through different parts addressing each other and replying, while moving from one side of the stage to the other, in so-called strophes (turns), antistrophes (counter-turns), and epodes (after-songs), enhancing the impression of the action by their remarks, by expressions of joy, sorrow, admiration, or horror, as caused by the things seen; by hymns of

thanks, or supplications to the gods; or addressing the heroes of the scene, advising or consoling, warning or approving in moralizing strains. It was thus that the chorus, standing between the heroes and the people, reflected as a mirror the conscience of the former and the consciousness of the latter, both affected by mighty events and tragic developments. The chorus thus forms the distinctive feature of the ancient drama, whose imitation has often, and almost always unsuccessfully, been attempted by modern poets, as for instance by Schiller in his *Braut von Messina*. The tragic chorus, in the periods subsequent to Æschylus, usually consisted of 15 members; the comic of 24. That Æschylus employed choruses of 50 is believed by some critics, but considered improbable by others. In the comic or satirical drama the chorus consisted of satyrs, and had its songs and dances mostly of a frivolous character. The providing for the choruses, the equipment and instruction, was in Athens an honorable though burdensome office, called *choragia*. (See **CHORAGUS**.)—In modern music, a chorus is a composition in several parts, each of which is to be sung by a plurality of voices, while all the parts are to be combined together in one simultaneous performance. The term is also applied to the performers who sing these parts. In operas and oratorios the chorus is indispensable to afford relief to the solos, duets, trios, and the like, as well as to express the culmination of any sentiment or passion; and composers have often made use of it with the happiest effect where the orchestra or single voices would prove totally inadequate. In secular music, the "Conjuration" chorus in Rossini's "William Tell," and the "Benediction of the Poniards" in Meyerbeer's "Huguenots," and in sacred music, the choruses in Handel's oratorios, and particularly in the "Messiah," are admirable specimens of this form of composition, and when well performed, with full orchestral accompaniments, produce the most sublime and thrilling effects of which music is capable.

CHOSE IN ACTION, that species of property which, in distinction from property in possession, consists in the right to reduce something of value to possession by means of some legal remedy. Thus, the right to recover money due on a bond is a chose in action, of which the bond is the evidence; and the right to recover damages for the unlawful conversion of one's property by another is also a chose in action. Formerly the law did not recognize a quality of assignability to such rights, but an exception was made of bills of exchange and promissory notes payable to order or bearer, and which in technical language were called negotiable; and the courts of equity went further, and protected the rights of assignees in all cases where the demand was for money due by contract express or implied, or for the conversion of property. And now the courts of law also recognize and protect the rights of as-

signees; but except in the case of negotiable paper, and such other cases as statutes may have provided for, the assignee, if he prosecutes, must do so in the name of the assignor.

CHOSROES, or **Khosru**, the name of two kings of Persia. **I.** Surnamed by historians the Just, by those of his nation Nushirvan (noble spirit), one of the most remarkable monarchs of the East, reigned from A. D. 531 to 579. He was of the house of Sassan, and the son and successor of Cabades or Kobad. In his youth he exhibited those qualities which afterward gained for him the title of "generous," and this is said to have rendered him the object of his father's predilections to the succession in preference to his two elder brothers; he appointed him king over one of his provinces, by which according to Persian usage he was designated as successor, and, in order to strengthen his choice, called on the Greek emperor to adopt him. The proposal was accepted, and Chosroes departed for Constantinople; but a puerile disagreement caused a rupture, the return of the prince, and perhaps his constant hatred to the Greeks. The last war of his father he terminated gloriously by a treaty of peace, in which Justinian promised to pay 10,000 lbs. of gold. Chosroes now directed his attention to the regulation of the affairs of his kingdom, which during his father's reign had been distracted by a long war with the Byzantine empire, and by civil and religious commotion; suppressed the sect of the followers of Mazdak, whose communistic theories in regard to property and marriage had been a source of disturbance; and appointed four viziers to rule the four great divisions of the state, Assyria, Media, Persia, and Bactriana. He extended its limits to the Indus and Oxus, and compelled the nomadic tribes of the northern barbarians to repress the latter river. But his chief wars were those against the Greeks. Viewing with concern the victories of Belisarius, the great general of Justinian, over the Vandals in Africa and the Goths in Italy, he roused his vassal the Arab Almondar, prince of Hira, to make an inroad into the empire, and soon afterward hostilities broke out between Persia and the emperor. Chosroes invaded Syria (540), plundered its cities, and took Antioch after a brave resistance. Belisarius, sent to defend the eastern provinces of the empire, was successful, but soon fell a victim to the intrigues of the court and was recalled, and Chosroes was again victorious. The war was continued for a series of years, chiefly in the districts east of the Black sea, and terminated by the peace of 562, by which the emperor bound himself to pay an annual tribute of 30,000 pieces of gold, and received the cession of the Persian claims upon Colchis and Lazica. This peace continued for ten years; but the conquest of Yemen in southern Arabia by the lieutenants of Chosroes, who wrested it from the Abyssinians, the allies of the Byzantine empire, incited Justin, the new emperor, to collect a great army and recom-

mence hostilities. He was defeated, and the Persians plundered Syria again. Tiberius obtained a truce of three years; this he employed in preparing a great army, and in the bloody battle fought near Melitene, in Lesser Armenia, the old Persian monarch was completely defeated (578). He died soon after, and was succeeded by his son Hormisdas (or Hormuz) IV.—The 48 years of Nushirvan's reign formed the golden age of modern Persia, in the history and poetry of the East. Dreaded by his enemies, he was revered and beloved by his subjects, who enjoyed the fruits of his victories and admired his justice; easily forgiving those crimes which served to confirm his throne, such as the murder of his two elder brothers, and the extermination of their families and adherents. His government was firm, vigorous, and impartial; the administration of justice was watched most scrupulously and severely; the poor were the particular objects of attention; orphans were educated at the public expense; the provinces were often visited by the monarch; the ancient religion of the Magi was respected; science and literature, trade and agriculture were zealously promoted; academies and libraries were founded, and enriched with the annals of the kingdom, as well as with translations from the Sanskrit, Greek, Latin, &c., among which the celebrated fables of Pilpay or Bidpay, expressly sent for to India, have become a literary monument even in the West. The wisdom of Nushirvan was admired by philosophers from Greece, and embassies were sent to him from Africa, India, China, and Thibet. **II.** Surnamed Parviz, grandson of the preceding, succeeded his father Hormisdas, who was deposed in 590. Prevented from occupying the throne by the rebel Bahram, he fled to the Greek emperor Mauritius, entreated his assistance, returned with an army, and defeated the usurper. Bahram escaped to Turkistan, where he perished soon after. In a treaty with Mauritius he rewarded his aid by a large sum of money, and the surrender of the most important cities of Mesopotamia. He continued in peace with Constantinople during that emperor's life, and kept a Greek body guard, so that Persia was in a considerable measure under Greek influences. His ally having been assassinated by Phocas (602), he took up arms against the empire with the ostensible purpose of avenging his death. A long war ensued, in which nearly all the Asiatic provinces of the Greeks were devastated and conquered, and which was not interrupted by the death of Phocas, or by the supplications for peace of Heraclius. Antioch, Cæsarea in Cappadocia, the whole of Palestine, Egypt with Alexandria, and Asia Minor, were wrested in successive campaigns from the new emperor; his capital, deprived of its supplies from Egypt, was a prey to famine, and threatened from the north by the Avars and other barbarians. Threatening to pass the Bosphorus and besiege Constantinople, Chosroes proposed

ignominious conditions of peace, which were rejected by Heraclius, and the war recommenced. The military glory, the pride and splendor of the Persian monarch had now attained their zenith. Master of western Asia, he oppressed the Christian inhabitants of the Byzantine provinces, and adorned with the spoils of the conquered his favorite residence, Dastagerd, east of the Tigris, about 60 m. from Ctesiphon, the capital. Its marvellous beauty and pomp have been extolled by visitors and poets, and even grave historians speak minutely of its paradise, or park, containing pheasants, peacocks, ostriches, roebucks, and wild goats; of its lions and tigers, destined for the pleasures of the chase; of the 960 elephants, 20,000 camels, 6,000 mules and horses, kept for the service of the camp and to carry the royal tents; of the 6,000 guards that watched before the gates; of the 12,000 slaves and 3,000 women subjected to his caprices or passions; of the precious metals, gems, silks, aromatics, in a hundred subterranean vaults of the palace; of its 30,000 hangings, 40,000 columns, and its cupola with 1,000 globes of gold imitating the motions of the planets and the constellations of the zodiac. But in the midst of all this greatness Chosroes was summoned in a letter from Mecca to acknowledge Mohammed the prophet of Allah. He tore the letter and rejected the proposal; upon which Mohammed is said to have exclaimed, "Thus will God tear his kingdom and reject his supplications." The first part of this prophecy was soon fulfilled by the victories of Heraclius, who in a series of brilliant campaigns (622-627) reconquered all the lost provinces of the empire, repeatedly defeated Chosroes, advanced to the Tigris, and finally won the great battle of Nineveh; after which the pusillanimous but proud and obstinate monarch fled with his favorite wife Sira, the Shirene of Persian poetry, and escaped the hands of his enemy only to be murdered at the command of his son Siroes, after having witnessed the massacre of his numerous sons, and suffered the horrors of a dungeon (628). Chosroes II. was the last mighty king of the house of Sassan; his son enjoyed the fruits of his unnatural deed only for eight months; and, after a few years of civil wars, Persia was conquered by the Arabs.

CHOTEAU, a N. county of Montana, bordering on British America; area, about 12,500 sq. m.; pop. in 1870, 517. It is drained by Milk river, by the Missouri, and by Dog, Judith, Arrow, Teton, and Bear's or Maria's rivers, affluents of the Missouri; Medicine or Sun river forms a portion of the S. boundary. The Bear's Paw, Little Rocky, and Judith mountains lie wholly or partly in the county. Some gold has been found, and coal is abundant. The estimated value of farm productions in 1870 was \$1,647, and of live stock \$6,000. Capital, Fort Benton.

CHOUANS, a name given to the royalist peasantry of Brittany and Lower Maine, in France,

who, following the example of the Vendéans, rose in arms against the revolutionary government as early as 1791, and who often, under the pretence of waging war in the king's behalf, infested the roads, pillaged villages, and committed all sorts of depredations. The name was ultimately extended to all the insurgents in western France. The rebellion in Lower Maine had been prepared by a number of contraband salt makers, among whom four brothers, named Cottureau, were conspicuous. The taciturnity of their grandfather had given him the nickname of *Chat-huant* (screech-owl), or *Chouan* according to the Bas Breton dialect. This nickname had been transmitted to the grandsons, who were usually called the "brothers Chouan." Jean, the eldest and boldest of the four, had once been sentenced to death, and, having through the entreaties of his mother obtained his pardon from Louis XVI., had become an ardent royalist. His earliest companions were a lame beggar surnamed *Jambe d'Argent* (Silver Leg), Tristan l'Hermite, Taillefer, Coqueureau, and a few others. Their first encampment was established in an excavation in the woods of Mison; and they began to appear in villages where revolutionary opinions prevailed, against detachments of troops and national guards. The *Chouannerie*, as these warlike bands were soon called, was not limited to a single province; from Lower Maine it extended through Brittany, where it gained a strong foothold, and thence eventually to Normandy. The Chouans received powerful accessions from the ranks of the peasants, driven to rebellion by heavy taxes, by persecution of their religion, or by fear of being enrolled in the army. The first serious outbreak in Brittany (Feb. 13, 1791) was occasioned by the attempted removal of the bishop of Vannes, who had refused to take the civil oath; the peasants of Sarzeau came forward to protect him, but were fired upon by troops of the line and national guards. Thenceforward Brittany was divided into two camps, the adherents and the opponents of the government. The military organization of the Chouans was gradually perfected, and they soon numbered no less than 100,000 volunteers, who were subsequently distributed into five distinct corps; but for the sake of efficiency they generally moved in bands of 25, 50, and sometimes 100 men, acting independently, but according to a common direction. In 1793, under the name of the Little Vendée, the Chouans joined the great royalist army. On this occasion it was proposed to invest one of the royalist generals with the command of the Chouans, but the reply was: "We have come with Jean Chouan, we know no one but him; we obey him through friendship; he must be our leader; if not, we will depart." Consequently Cottureau reassumed the command of his forces, which he kept until July 28, 1794, when he was killed in an encounter with republican troops. Tactics and regular evolutions were not in accordance with

the instincts and habits of these partisan bands. Consequently, after the heavy loss experienced by the royalist army near Le Mans, and especially after their bloody defeat at Savenay, Dec. 27, 1794, the Chouans returned to their haunts, and resumed their guerilla warfare. Detachments of troops were overtaken or slaughtered, stage coaches were arrested on the highway, receivers of public money were carried off and tortured, and the chiefs were powerless to prevent these excesses. On the death of Cotteureau, Jambe d'Argent had become one of their leaders; but the most popular was Georges Cadoudal, who had then taken up his abode in Lower Brittany, and waged unrelenting war against the republican troops. Some attempted to bring about a pacification by a treaty concluded at La Mabilais; but this was rejected by Cadoudal and other influential Chouans. Even the disaster of Quiberon, July 16, 1795, was unable to shake their power. The loss of that disaster had fallen on the *émigrés* and the English, while the royalist peasantry had suffered little. They not only kept in arms, but their chiefs tried to reënforce their organization and to bring about insurrection in several other provinces of France. Their efforts were in some measure successful, and would have been completely so if any prince of the Bourbon family had dared to land in Brittany and put himself at the head of the movement. The count d'Artois indeed cruised off the coast of France for a few days in August, 1795, and this alone was sufficient to give a new impulse to royalist ardor; but the disappointment caused by his sudden departure crushed the hopes of the most zealous. Some chiefs and several bands still persisted, but the great army of the Chouans dwindled away, disgusted at serving princes by whom they were sacrificed. The most obstinate joined the *émigrés* in several conspiracies. Cadoudal was arrested and executed in 1804, and the Chouannerie may be said to have died with him.

CHOUGH (*coracia gracula*, Linn.), a bird of the crow family, sometimes called Cornish daw, and red-legged crow. It is a native of Europe, and is most numerous on the bold rocky shores of Cornwall, Devonshire, Wales, and the Hebrides islands; on the continent it prefers the Alpine regions. The plumage of the adult male and female is black, glossed with purplish blue and green; the legs, feet, and bill are red; the claws black, strong, and hooked; the bill is longer than the head, arched and tapering to an acute point; the wings are about the same length as the tail, which is even, with a small tip; on the head and neck the plumage is blended and highly glossy. The length to the end of the tail is 17 in.; extent of wings 34 in.; tail $6\frac{1}{2}$ in.; bill $2\frac{1}{2}$ in.; tarsus $2\frac{1}{8}$ in.; weight about 14 oz. The female is somewhat less in size, and has a shorter bill. When seen at a distance, the chough resembles the rook, which it excels in elegance of form; near at hand, the red bill and feet readily dis-

tinguish it. It is gregarious like the rook and jackdaw, both of which it resembles in its note and mode of flying. Its food consists of insects, grubs, seeds, and the flesh of dead animals; it is particularly fond of grasshoppers and cockchafers, for which it scratches fields and rocky places, walking like the rook. It is very shy, unless in the breeding season; its flight is high, irregular, and performed by slow motions. It breeds near the sea in rocks, caverns, and ruined towers; the nest is composed of sticks, and lined with wool and hair; the eggs are generally five in number, of a dull white color, with light brown and ash-colored spots, chiefly at the larger end. In confinement the chough becomes very tame and docile; it is very crafty, hiding its food, and frequently articles of value which it has stolen, and as the bird always selects elevated positions, it is often difficult to recover them. It



Chough (*Coracia gracula*).

eats little at a time and regurgitates its food like ruminating quadrupeds; even when full fed, it will try to throw up a portion of its meal in order to take a little more. It is capable of very strong attachments and dislikes.

CHOULES, John Overton, D. D., an American clergyman, born in Bristol, Eng., Feb. 5, 1801, died in New York, Jan. 5, 1856. His parents were members of the Wesleyan connection; but he united with the Baptist church, and in 1822 became a student of divinity in the Baptist college at Bristol. Having completed his theological course, he emigrated to America in 1824. The first winter after his arrival in New York was spent in supplying various churches in that city and vicinity. In the spring of 1825 he became principal of an academy at Red Hook, N. Y. In September, 1827, he was ordained as pastor of the second Baptist church in Newport, R. I. After a pastorate of about six years, he accepted the call of the first Baptist church in New Bedford, Mass. In 1837 he became pastor of the Washington street church, Buffalo, in 1841 of the Sixth street Baptist church, New York, and in 1843 of the Baptist church at Jamaica Plain, near

Boston. In 1847 he resumed the pastorate of the second church in Newport, and in 1854 accompanied Mr. Vanderbilt in his steam yacht on a voyage to Europe. He was the author of two volumes of travels, entitled "Young Americans Abroad" and "The Cruise of the North Star." Besides these volumes, he completed Smith's "History of Missions" (2 vols. 4to, 1832); wrote a continuation of Hinton's "History of the United States;" and edited Neal's "History of the Puritans," Forster's "Statesmen of the Commonwealth in England," and James's "Church Members' Guide."

CHOUTEAU. I. Auguste, an American pioneer, born in New Orleans in 1739, died in St. Louis, Feb. 24, 1829. He and his younger brother Pierre were the founders of the city of St. Louis, and their lives were closely connected. **II. Pierre**, brother of the preceding, born in New Orleans in 1749, died in St. Louis, July 9, 1849. In August, 1763, the two brothers joined the expedition of Laclède, under a commission from the director general of Louisiana, to establish the fur trade in the region west of the Mississippi river, and bordering on the Missouri and its tributaries. Auguste was intrusted by Laclède with the command of the boat. They reached the settlement of St. Genevieve in November, being just three months ascending the river from New Orleans. In the winter they selected a point 61 m. above St. Genevieve, on the western bank of the Mississippi, for their principal post, and named this St. Louis. Auguste Chouteau was in charge of the party that commenced operations here, Feb. 15, 1764. Speaking of the brothers in his "Sketch of the Early History of St. Louis," Nicollet observes: "These two young men, who never afterward quitted the country of their adoption, became in time the heads of numerous families, enjoying the highest respectability, the comforts of an honorably acquired affluence, the fruit of their own industry, and possessed of a name which to this day (1842), after a lapse of 70 years, is still a passport that commands safety and hospitality among all the Indian nations of the United States, north and west." Both were prominent men, and officers ranking as colonels in the early history of St. Louis. **III. Pierre**, son of the preceding, born in St. Louis, Jan. 19, 1789, died there, Sept. 8, 1865. He was at first a clerk with his father and uncle, who were then largely engaged in the fur trade with the Indians, but soon entered into business for himself. Following the Indians as they receded from point to point, he at different times established himself at what are now St. Joseph, Kansas City, Bellevue, Council Bluffs, Fort Pierre, Fort Berthold, Fort Union, at the mouth of the Yellowstone river, and Fort Benton, at the head of navigation of the Missouri. As early as 1806 he went up to Dubuque to trade with the Sacs and Foxes, ascending and descending the rivers in canoes. He also followed the Indians as they receded up the

Osage river, and up the Mississippi from Keokuk to St. Paul, having trading posts all along the rivers. In 1834 he and his associates purchased the interest of John Jacob Astor in the American fur company; and in 1839 they formed the trading company which, under the firm name of P. Chouteau, jr., extended its operations southward as far as the Cross Timbers in Texas, northward to the falls of St. Anthony, and northwestward to the Blackfeet country, monopolizing the fur trade of the entire region east of the Rocky mountains, and also controlling the trade with Santa Fé in New Mexico. This business involved large transactions in the eastern cities and in Europe, and for many years Mr. Chouteau resided in New York. In 1819 he was a member of the convention which framed the first constitution for the state of Missouri, but with this exception he never engaged in politics.

CHOWAN, a N. E. county of North Carolina, bounded S. by Albemarle sound, and W. by Chowan river, a broad arm of the sound; area, about 240 sq. m.; pop. in 1870, 6,450, of whom 3,369 were colored. It was one of the original precincts of the lords proprietors under King Charles II., and was occupied by a tribe of Indians called Chowanokes. The surface is slightly uneven, and the soil generally of good quality. The chief productions in 1870 were 9,176 bushels of wheat, 137,647 of Indian corn, 41,130 of sweet potatoes, and 1,331 bales of cotton. There were 451 horses, 637 milch cows, 1,177 other cattle, and 5,829 swine. Capital, Edenton.

CHRÉTIEN (or Chrestien) DE TROYES, a French poet, born probably at Troyes about 1150, died near the close of the 12th or in the beginning of the 13th century. Of his life little is known, except that he was one of the most learned men and gifted trouvères of his day, and that he acquired great celebrity in France, Germany, and other parts of Europe. As some of his works were dedicated to Philippe of Alsace, count of Flanders and Vermandois (1168-'91), he is supposed to have been the laureate at that court. Some works written by others have been attributed to him, while some of his genuine works, including *Tristan*, or *Del roi Marc et d'Ysolt la blonde*, and the *Chevalier à l'épée*, are apparently lost. His fame rests upon six romances, which are extant in French libraries, with the exception of *Li romans dou chevalier au Lyon*, published by Holland (Hanover, 1862), which served as a basis for Hartmann's *Von Aue Iwein*. His other works are: *Iric et Enide*, or *Li contes d'Erec* (published in Haupt's *Zeitschrift für deutsches Alterthum*, Leipsic, 1855; reproduced in Hartmann's *Von Aue Erec*); *Lancelot du lac ou de la Charette*, or *Li romans del chevalier de la Charette* (continued by Godefroy de Laigny, published by Jonckbloet, the Hague, 1850); *Oliget, chevalier de la table ronde*, or *Li contes de Oliget*; and, the most celebrated of them all, *Perceval le Gal-*

lois, or *Li contes del Graal* (with continuations by Gautier de Denet, Gerbert, and Manesier). The last two have not yet (1873) been printed; but his *Contes del roi Guillaume d'Angleterre* were published by Michel in his *Chroniques anglo-normandes* (3 vols., Rouen, 1840), and served as a basis for O. Schönhut's *Historie von König Wilhelm und seinen Söhnen* (Reutlingen, 1852).

CHRISM (Gr. *χρίσμα*, ointment), in the Roman and Greek churches, ointment consecrated by the bishops, and used in the administration of baptism, confirmation, ordination, and extreme unction. There are two sorts of chrism used in the Roman church: one made of olive oil and balsam, which is used in baptism, confirmation, and in conferring orders; the other is composed only of oil, and is used in extreme unction. These are always blessed by the bishop on Maunday Thursday, and each priest is required to obtain a fresh supply and burn the old oils. In the Greek church, besides the oil and the balsam, it is usual to employ 35 kinds of spices. The Maronites formerly used balsam, musk, cloves, incense, roses, and other substances.

CHRIST (Gr. *χριστός*, anointed), a title applied in the New Testament to Jesus, and derived from the ancient practice of consecration by anointing to the regal, prophetic, and sacerdotal offices. The practice is still preserved in the consecration of kings. The apostles designate Jesus by his official title much more frequently than by his historical name. The reverse is the practice of the evangelists. (See JESUS CHRIST.)

CHRIST, Pictures of. Among the early Christians, the aversion to the fine arts, as practised by pagan nations, was so great, that no pictorial representation of Jesus Christ was ventured upon, except symbolically through the signs of the lamb, the vine, and fish; the Greek term for fish, *ἰχθὺς*, constitutes the initial letters of the following Greek sentence, significative of Christ's mission, *Ἰησοῦς Χριστὸς Θεοῦ Υἱὸς Σωτὴρ*, thus establishing a monogram, which has acquired a sacred celebrity. The earliest artistic effort to commemorate the life of Christ is parabolical, namely, representing him as a shepherd among his flock, with a shepherd's flute; also in search of the lost sheep, or carrying it after having found it. In these representations, which abounded at the time, Christ appears with the ideal attributes of a youth; also in some instances in the maturity of manhood. Accounts have come down to us of pictures of Christ in the possession of King Abgar of Edessa and of St. Veronica, also of one ascribed to St. Luke; but these accounts are as little supported by historical evidence as the tradition of a miraculous picture at Berytus, and of a statue erected to his memory by the woman whom he had restored to health. The *Veronica*, also known as the *Ecce Homo*, is said to be the impression taken on a linen cloth which a woman named Ve-

ronica offered to the Saviour to wipe his face, while on his way to crucifixion. The original miraculous picture is said to have been preserved in St. Peter's church in Rome as late as about the year 700. The most ancient portrait of Christ was in the possession of the emperor Alexander Severus. In the *Museo Cristiano* of the Vatican is another picture of the Saviour, also dating from the 3d century, worked in antique mosaic, ascribed to a pagan artist, and representing the Saviour as a philosopher. Equally ancient portraits of Christ are found in the Calixtinian and Pontian catacombs near Rome, and are contained in Aringhi's *Roma Subterranea Nona*. Here Christ is represented with an oval face, straight nose, arched eyebrows, and high forehead. The expression is solemn, yet tender. The light brown hair, parted in front, descends in long curls upon the shoulders; the beard is rather short and unequal. A writer of the 8th century, John of Damascus, represents Jesus as having been of imposing presence, with bushy eyebrows, singularly beautiful eyes, regular nose, curling hair, black beard, yellow complexion, resembling the Virgin Mary, &c. A supposititious letter, purporting to have been written by Lentulus, Pilate's predecessor, to the Roman senate, also represents him as having possessed great personal beauty; but this letter is now known to have been written in the 14th century, and to have been based upon the portraits in the catacombs. The pictorial representations of the head of Christ, which made their first general appearance toward the end of the 4th century, and which served as types during the middle ages, were taken from the impressions traceable to these descriptions, and which, however conflicting in details, were all agreed in the general attributes of beauty in Christ's appearance. From the early middle ages down to Michel Angelo and Raphael, we find the same original conception guiding the minds of artists. Raphael's "Christ in the Sepulchre," and Leonardo's in the "Holy Supper," are generally considered the most beautiful pictures of Christ extant. Titian also excelled in this branch of sacred art; his head of Christ in the "Tribute Money" in the Dresden gallery is his best. Among subsequent artists, Ludovico Carracci's heads of Christ are full of expression.—See Grimm's *Die Sage vom Ursprung der Christusbilder* (Berlin, 1843).

CHRISTCHURCH, a parliamentary and municipal borough, town, and parish of Hampshire, England, 20 m. S. W. of Southampton; pop. of the parliamentary borough in 1871, 15,415. It is 7 m. from the Christchurch station on the Southampton and Dorchester branch of the Southwestern railway, on the S. W. border of the New forest, at the confluence of the Avon and Stour, about 1½ m. above their mouth in Christchurch bay, an inlet of the English channel, about 11 m. long. It derives its name from a fine old church founded in early Saxon times, and rebuilt under William II. In

Christchurch bay a double tide occurs every 12 hours.

CHRISTCHURCH, a town of New Zealand, the capital of the province of Canterbury, on the banks of the Avon, about 7 m. from the sea, and about 9 m. from Lyttleton, which is its port; pop. of the town proper in 1871, 7,931; of the town and suburbs, 12,466. It is connected with Lyttleton by a railway tunnelled at great expense through the Lyttleton hills, and with all the principal towns of New Zealand by telegraph. It is the seat of an Anglican bishop, and has numerous fine buildings, among others the college, the supreme court, the immigration barracks, and the banks. It has also flourishing manufactories.

CHRISTIAN. I. A S. W. county of Kentucky, bordering upon Tennessee; area, 704 sq. m.; pop. in 1870, 23,227, of whom 9,812 were colored. It is watered by a number of small streams, several of which flow for 2 or 3 m. through subterranean channels. The soil in the southern and level part of the county is productive; the northern part is hilly, and its wealth consists chiefly in forests and mines of coal and iron. The Evansville, Henderson, and Nashville railroad passes through the county. The chief productions in 1870 were 242,980 bushels of wheat, 778,533 of Indian corn, 65,577 of oats, 2,353 tons of hay, 155,725 lbs. of butter, 28,727 of wool, and 5,384,137 of tobacco. There were 3,923 horses, 2,777 mules and asses, 3,325 milch cows, 5,004 other cattle, 11,942 sheep, and 26,561 swine. There were 6 grist mills, 5 saw mills, 1 distillery, 2 manufactories of furniture, and 4 of saddlery and harness. Capital, Hopkinsville. **II.** A central county of Illinois, bounded N. by Sangamon river, and intersected by the S. fork of that stream; area, 675 sq. m.; pop. in 1870, 20,363. It has a generally level surface, diversified by timber lands and fertile prairies. It is traversed by the Illinois Central, the Indianapolis and St. Louis, and the Springfield and Illinois Southeastern railroads, and the St. Louis division of the Toledo, Wabash, and Western. The chief productions in 1870 were 522,401 bushels of wheat, 1,883,336 of Indian corn, 383,821 of oats, 86,161 of potatoes, 22,964 tons of hay, 193,572 lbs. of butter, 63,247 of wool, 21,040 of honey, and 31,322 gallons of sorghum molasses. There were 9,229 horses, 4,470 milch cows, 7,991 other cattle, 15,585 sheep, and 35,015 swine. There were 2 manufactories of agricultural implements, 3 of bricks, 5 of carriages and wagons, 1 of sashes, doors, and blinds, and 7 grist mills. Capital, Taylorville. **III.** A S. W. county of Missouri, drained by James river and branches of the White; area, 500 sq. m.; pop. in 1870, 6,707, of whom 114 were colored. The surface is undulating or hilly; the soil in the valleys is fertile. Timber is plentiful. The Atlantic and Pacific railroad passes through the N. W. extremity. The chief productions in 1870 were 56,574 bushels of wheat, 216,185 of

Indian corn, 45,260 of oats, and 16,132 lbs. of tobacco. There were 2,601 horses, 1,826 milch cows, 2,815 other cattle, 7,071 sheep, and 14,847 swine. There were 3 grist mills, 4 saw mills, and 2 wool-carding factories. Capital, Ozark.

CHRISTIAN, the name of nine kings of Denmark. Since 1448 the Danish kings (with the single exception of John, 1481-1513) have upon their accession to the throne assumed alternately the names of Christian and Frederick. The following are the more important of them.

I. Christian II., surnamed in his own country the Fiery, and in Sweden the Tyrant, son and successor of King John, born at Nyborg, July 2, 1481, died at Kallundborg, Jan. 24, 1559. His education was imperfect, and his habits became dissolute. At the age of 20 his father intrusted to him the repression of a rebellion in Norway, having previously placed him under the guidance of the bishop of Hammer. No sooner were they arrived in Norway than the prince destroyed the bishop's commission, and shut him up in a dungeon, where he soon died. Christian quelled the insurrection, nearly extirpated the Norwegian nobility, and carried fire and sword across the border into Sweden. During this expedition he met with the daughter of Sigbrit Willius, the hostess of a petty inn in Bergen. The daughter, known only as *Dyveke*, "Little Dove," was of wonderful beauty, and became Christian's mistress. Upon the death of King John (1513), during whose reign the union of Calmar had been reestablished, Christian was crowned at Copenhagen and at Opslo (now Christiania) in Norway. At the time of his father's coronation at Stockholm, Christian was recognized by the Swedes as successor to the Swedish throne; but in the mean time successful rebellion had again partly emancipated Sweden from the Danish yoke. Christian, being about to invade Sweden, married Isabella, sister of the emperor Charles V. of Germany; but he still retained his mistress Dyveke, whose mother, a woman of singular talents, had already achieved a complete ascendancy over his mind. He invested her with the administration of the customs revenue, and with the collection of the tolls at Elsinore. She diminished many duties and taxes in order to encourage exportation; and this measure, of serious injury to the Hanse towns, was the cause of their alliance at this juncture with Sweden. Sigbrit also brought about many restraints upon the nobles and clergy, especially in monopolies which they enjoyed. In the fourth year of Christian's reign Dyveke suddenly died, probably by poison. Suspicion fell first upon members of the senate, who aimed to rid themselves of the influence exercised against them by Sigbrit; but afterward upon a young Dane, Torben Oxe, the master of the royal household. The youth had fallen desperately in love with Dyveke, and the tragedy followed, brought on probably by the despair of the guilty couple. Sigbrit, whose

influence had greatly increased, instigated the king to the most extreme cruelties. Meanwhile great preparation was made in Sweden to resist the Danish invasion. The Swedish administrator or regent, Sten Sturé, had appointed Gustavus Trollé to the archbishopric of Upsal. The new primate, still young, had completed his religious studies at Rome, and on his way home had met at Lübeck a confidential agent of Christian, who had little difficulty in obtaining a promise to support the pretensions of the king. Christian found means also to gain over to his cause, at least in appearance, the papal legate; but that personage disclosed to the regent the projects of Christian, as well as the treason of Trollé and of certain commanders of fortresses bribed by the Danes. The governors of the fortresses were arrested, and revealed the plot, which they said was directed by Trollé, who, disregarding a summons to appear before the diet, fortified himself in his castle. A Danish army, which had landed to relieve Trollé, was attacked by the regent and driven back. Sturé then forced the castle of the archbishop, compelled his abdication, sent him a prisoner to the monastery of Wodstena, and razed his castle to the ground. The pope placed Sweden under interdict. The regent and his followers were excommunicated, and condemned to pay to Trollé 100,000 ducats, and to rebuild his castle. The execution of the bull was intrusted to Christian, who besieged Stockholm with a powerful fleet and army, but was driven off by Sturé. Feigning a wish to treat, he obtained from the regent provisions for his fleet, and put in irons six Swedish nobles, among them Gustavus Vasa, who had been sent to him as hostages during the truce. These, he sent word to Sturé, should be put to death unless Danish authority were immediately accepted. The Swedes made a sharp attack, but the wind setting fair, Christian weighed anchor and sailed with his prisoners to Copenhagen. Next year he seized a quantity of copper belonging to the papal legate which was about to pass the strait at Elsinore. This, in addition to the payment by Charles V. of part of his sister's marriage portion, enabled him to resume his operations against the Swedes, and the expedition was embarked in January, 1520. At the first battle, fought at Bogesund, the Swedish regent fell mortally wounded. The Danes advanced by forced marches between the lakes Wenner and Wetter, and reached the forest of Tiwed, the ancient rampart of northern Sweden. Here the peasants made a desperate stand against the invaders, who however outflanked them, cut them to pieces, and gained the high road to the capital. A baronial diet, which had been convoked at Upsal, saw that resistance was hopeless, and entered into a convention with the Danes that Christian, on condition of a promise of general amnesty, should be crowned king of Sweden. Christian, who had remained at Copenhagen, signed the convention in that city

on March 31, 1520. Stockholm and Calmar, the two great fortresses of Sweden, still held out against the invaders, and were defended each by a woman. The widow of the regent, Christina Gyllenstjerna, refused to accept the treaty, and aroused the burghers of Stockholm to a desperate resistance. Lübeck and Dantzic promised her assistance; and the peasants from the neighboring farms engaged to harass the enemy in the rear, but they had no leader. Christina held out for four months, when she was compelled to capitulate. Calmar shared the same fate, and in September Christian was everywhere acknowledged. He now resolved upon the extirpation of his enemies. As executor of the papal bull, he pretended that his promise of amnesty as king must not conflict with his duties as representative of the supreme pontiff. The coronation was solemnized in the presence of the Swedish nobles and clergy. Festivities followed during the next three days, when an assembly was held in the great hall of the palace. Christina was summoned to hear her husband denounced and reviled by the creatures of the king. His surviving adherents among the nobles were at once declared and condemned as heretics. The city gates were closed and guarded. Scaffolds and blocks arose during the night in the great square. The first head to fall was that of the venerable bishop of Strengnäs; immediately after him the bishop of Skara and 13 nobles, among whom was the father of Gustavus Vasa. For two days the butchery continued, and dead bodies lay in masses in the streets. The king at length permitted the corpses to be removed to an eminence outside of the city. Upon them he caused the remains of the regent and of his infant child to be flung; and then they were burned. The widows and daughters of the murdered men were abandoned to the soldiery. Christian travelled through the country, marking every stage of his journey with blood; whole families were extirpated. Gustavus Vasa had now escaped to Sweden, and, reaching the borders of Dalecarlia, had aroused the peasants of that province. He issued from the northern provinces at the head of 20,000 men, and went on from victory to victory. Christian summoned him, upon pain of the instant execution of his mother, who was imprisoned with his sisters at Copenhagen, to lay down his arms; he refused, and their death followed shortly afterward in their dungeon. Christian meanwhile, leaving the defence of Sweden to his generals, made a visit to his brother-in-law, the emperor Charles V., in the Netherlands, to solicit the arrears of his queen's dowry, and assistance in a quarrel with the duke of Holstein and the Hanse towns. He was received at Brussels with great magnificence, but obtained little or no satisfaction in his suit. His dominions now were everywhere distracted. Slaghöck, the king's confessor, had meanwhile been made archbishop of Lund; and there now arrived a papal nuncio demanding expla-

nation of the deaths of prelates and others in Sweden. The king accused his unhappy confessor as the cause of the executions. Slaghöck was imprisoned, tortured, and burned at the stake, while the nuncio pronounced the king innocent of all sin. A second legate, however, insisted upon the deposition of Trolle. About the same period two legislative measures, wise in themselves, but which struck at the privileges of the aristocracy, precipitated the fall of Christian. He published a decree which forbade the sale of serfs. A second decree affected property in wrecks: everything cast on shore by the waves had at one time been royal property; but the barons had lately usurped this right, and now it was decreed that the waifs should be delivered to the king's bailiffs, to be by them returned to the shipwrecked mariners within the space of one year. Failing this, the property was to be sold, two thirds of the proceeds to go to the king, and the remainder to the church. One year after the sacrifice of Slaghöck, Christian received mysteriously the first announcement of his impending fall. A glove containing a letter from a number of nobles and priests was left in his tent during the night. The king had taken the field against a Lübeck army invading Seeland and Scania. A vast conspiracy of Jutland clergy and nobles was now disclosed to him, and the letter contained their renunciation of allegiance, and announced that they were about to offer the crown to Frederick, duke of Holstein, who accepted the invitation. Christian sent an envoy to the rebellious barons, acknowledging his errors, and praying them to accept again their repentant sovereign. His offers were rejected, and he hurried to Copenhagen, and wandered about the streets, imploring the people to save him from his enemies. Seeland and Scania swore allegiance anew, and Christian might yet have saved his crown. But the weakness which he continued to exhibit cost him every trustworthy friend, and, collecting some 20 ships, he embarked with his family, carrying off the public records, the crown jewels, and all the treasures within his grasp. Sigbrit, who durst no longer show herself, was carried on board secretly in a clothes chest. The king, his wife, children, and a few faithful servants followed, and the fleet sailed from the harbor. This event, which occurred in April, 1523, ended for ever the famous Calmar union, after a period of 126 years. In Denmark the flight of Christian was a serious calamity to the people. His municipal regulations, due to the woman Sigbrit, no doubt were excellent and original. Advocates were admitted to courts to plead the cause of the accused, and to appeal from the tribunals to the crown. He reformed and regulated the customs tariff and taxes. He established inns and post offices for the first time in Denmark. The poor of Denmark deplored the loss of the king who is known in history as a remorseless tyrant. On quitting the harbor of Copenhagen, Christian's fleet

was dispersed by a violent storm. After having been nearly wrecked upon the coast of Norway, he at length reached Antwerp in safety. He found means to invade Holstein with 10,000 men, but was again compelled to flee. In 1531 he sailed again at the head of 12,000 men; his fleet was dispersed, but he landed in Norway, where the new king of Denmark, Frederick, was hated. The Norwegian bishops and nobles declared for Christian, and on Nov. 30, 1531, he was solemnly acknowledged king. The common danger meanwhile brought about peace between Frederick and Gustavus Vasa. A treaty for mutual defence was concluded, and a Swedish army entered Norway. Christian's fate was soon decided. His ships were burned, his troops mutinied from hunger and want, and he was forced to surrender himself to the Danish admiral, stipulating for a safe conduct to Denmark, in order that he might confer personally with his uncle King Frederick. If no amicable compromise of their differences should be arrived at, it was understood that he should be free to quit the kingdom. Frederick was not permitted to ratify the agreement, but was compelled to declare that the admiral had exceeded his powers. So bitter was the hatred of the Danish nobles against their late king, that Frederick was obliged to give them a written assurance that Christian should be kept in perpetual imprisonment. The document containing the pledge was formally committed to the custody of eight barons; and the condemned king entered upon 27 years of retribution. He was first conveyed to the castle of Sonderburg, in the island of Als. Here he was placed in a vaulted apartment of which all the windows were walled up, one little aperture near the ceiling alone excepted for air and light, and through which to receive his food. In this dismal dungeon, with a Norwegian dwarf who was given him for a companion, he passed 17 years, the first 12 without any alleviation whatever of his misery. A stone table remains in the castle, around the edge of which is still shown a line of indentation, worn it is said by the hand of Christian, whose sole exercise and pastime in this narrow abode consisted in walking around the table, with his hand resting on it. Still another war was waged for his liberation, but without success. In 1544, at the intercession of the emperor his brother-in-law, the rigors of his imprisonment were somewhat mitigated; and at length, upon the renunciation of all his pretensions in 1549, he was removed to the castle of Kallundborg in Seeland, on the coast of the Great Belt, and made comfortable, with a fixed income, and with permission occasionally to hunt in the adjoining forest. But calamity had worked upon his mind, and attacks of despondency became of frequent occurrence. These were made violent by immoderate use of wine, and at Kallundborg his malady often assumed the charac-

ter of insanity until he died. He had had three children. John, the eldest, was educated under Charles V., but died at Ratisbon on the day his father was imprisoned at Sonderburg. A daughter, Dorothea, was married to the elector palatine, Frederick II.; and Christina first to Francis Sforza, and subsequently to the duke of Lorraine. **II. Christian IV.**, born in the palace of Fredriksborg, April 12, 1577, died in Copenhagen, Feb. 28, 1648. His father, Frederick II., died April 4, 1588. Under the direction of his mother, Sophia of Mecklenburg, and the senatorial council of noblemen, which latter usurped the regency during his minority, he became proficient in foreign languages and mathematics, and especially in naval sciences. After the declaration of his majority as duke in Schleswig-Holstein in 1593, and as king in Denmark and Norway in 1596, and his coronation in the latter year, he applied himself to the promotion of reforms in Norway, which country he had previously visited, and where he subsequently founded Christiania, the capital, and Christiansand. Russia and Sweden claiming sovereignty over the Norwegian portion of North Lapland, Christian made in 1599 a naval demonstration against the former power, and considerably increased his armaments. But peace was not disturbed till 1611, when Charles IX. of Sweden, who had arrogated to himself the title of king of Lapland, and who was jealous of the increasing power of Denmark on the Baltic, attempted to exclude the Danish shipping from the coasts of Livonia and Courland, fortified the town of Gothenburg, and perpetrated other acts of defiance which led Christian to engage in hostilities. He immediately occupied the island of Öland and the citadel of Calmar, whence the name war of Calmar; captured other Swedish strongholds, and destroyed Gothenburg. Gustavus Adolphus, who succeeded to the Swedish throne after the death of Charles IX. in 1611, concluded a treaty of peace with Christian at Siörod in 1613, through the mediation of James I. of England, who had married the princess Anne of Denmark, sister of Christian. By the terms of this treaty the Swedish sovereign relinquished the title of king of Lapland, recognized the freedom of navigation of the Baltic, and paid 1,000,000 rix dollars for regaining the territory taken by Christian, who waived the claims which he had occasionally asserted to the Swedish crown. Christian now devoted himself more than ever before to the arts of peace. He extended and embellished Copenhagen, reorganized the university, increased the number of churches and palaces, established an observatory, a botanical garden, a free school for poor students, gymnasia, and libraries, and founded an academy at Sorö for young noblemen, with eminent foreign professors, to check the practice of studying abroad. Displaying the same energy in promoting commerce and enterprise, he opened

the trade with the East Indies, where the first Danish settlement at Tranquebar was founded by a trading company under his auspices. He stimulated geographical explorations by sending out a number of expeditions for the discovery of a passage between North America and Asia, which paved the way for Norwegian and Danish settlements in Greenland. Among the new towns founded by him was Glückstadt, as capital of Holstein, for the defence of the Elbe, whence arose the name of the Holstein-Glückstadt dynasty, to distinguish it from that of Holstein-Gottorp. As duke of Holstein, and to that extent a sovereign German prince, and owing to his high renown, he was selected in 1625, during the thirty years' war, as chief of the Protestant armies, and personally assumed command in the circle of Lower Saxony. He crossed the Elbe at Stade with 25,000 Danes, Germans, Scotch, and English, and was reinforced by 7,000 troops from the circle. He was defeated, Aug. 27, 1626, by the vastly superior forces of the Bavarian general Tilly at Lutter, near Wolfenbüttel, and was obliged to fall back on Stade, where he was joined by 6,000 British troops and by a small corps of French. But he was forced to retreat before Wallenstein, who had made a junction with Tilly; and the imperialists invaded Holstein and Jutland. The duke Frederick III. of Holstein-Gottorp, Christian's nephew and vassal, betrayed Denmark by making a separate treaty with Wallenstein in 1627, surrendering to him the national fortresses; while the foreign occupation created a spirit of discontent in the duchies, which became a source of disturbance and contention. Supported by Austrian and Spanish forces, Wallenstein occupied the ports of Rostock, Wismar, and other places on the Baltic; but Christian inflicted severe losses on him at Stralsund, and forced him to raise the siege of that city. Peace was finally concluded at Lübeck in May, 1629, Denmark recovering Schleswig-Holstein and Jutland, but, with the exception of these territories, renouncing all interference in German affairs. Her allies, especially the dukes of Mecklenburg, were stripped of all their possessions; and except for the influence of France, Christian himself would have been doomed to great humiliations. Barely recovered from these calamities, but nothing daunted, Christian in 1630 chastised the citizens of Hamburg, who had disputed the Danish supremacy of the Elbe, by destroying 30 of their men-of-war, and imposing upon them the payment of dues for each vessel passing Glückstadt, and at a later period demanding an indemnity of nearly 300,000 rix dollars. The senate, consisting of the nobles, continued in the mean while to thwart the attempts of Christian to protect the national interests on the Baltic against encroachments by foreign powers. Sweden availed herself of this state of things to form a coalition with Holland against Denmark, and Christian made a secret alliance with the emperor Ferdinand III.

against Sweden. At the instigation of the Swedish chancellor Oxenstiern, Holstein was invaded by Swedish forces in 1643, the duke of Holstein-Gottorp once more betraying his liege lord by placing the enemy in full possession of the territory. In a naval action off the island of Femern, near Kiel, known as the battle of Kolberg heath, Christian was severely wounded and lost an eye. His heroism, commemorated in a famous national ballad, greatly enhanced his personal popularity; but the war ended disastrously, chiefly owing to the opposition of the Danish senate to its continuation, and the king was reluctantly obliged to conclude the treaty of peace of Brömsebro (Aug. 13, 1645), ceding the Norwegian districts of Jemtland and Herjedalen, the islands of Gothland and Ösel, and other territory to Sweden, including the occupation for 30 years of Halland, and releasing Sweden from the Sound and Belt dues, while these were at once reduced for the Dutch to the rate fixed at a later period for friendly maritime powers. In addition to these disasters, Christian was greatly annoyed by the conduct of the duke of Holstein-Gottorp; these dissensions paving the way for interminable future contests in regard to the interior and exterior relations of the duchies. These reverses preyed at length upon the king; and the premature death of his son Christian, the presumptive heir to the throne, was an additional source of sadness, and accelerated his own death. Of a majestic and noble presence, Christian had endeared himself to his subjects by his love of justice and humanity, by his efforts for intellectual and general improvement, and by his gallantry and indefatigable patriotic labors; and his portrait is still found in the dwellings of the peasants as well as of the higher classes. He was succeeded by his son Frederick III.—His queen, the princess Anne Catharine of Brandenburg, died in 1612; and in 1615 he contracted amorganatic marriage with the daughter of Munk, a Danish nobleman, whom he repudiated in 1630. She had borne him many daughters, who married noblemen and senators. Prominent among them, by her virtues and accomplishments, was LEONORE CHRISTINA, countess of Schleswig-Holstein (born July 10, 1621, died about 1698). She married in 1636 Count Corfitz-Uhlfeld, the son of a Danish high chancellor. He became in 1643 major-domo, but after being suspected of conspiring against the life of the king, and incurring general odium, he left Denmark in disgrace. Intriguing in Sweden against his country, but distrusted, he fled to Flanders, where he continued to conspire against Denmark. He was sentenced to death in contumacy, July 24, 1663. He escaped to Basel, but was accidentally drowned while crossing the Rhine, Feb. 20, 1664. His wife repaired to England, where the government secretly surrendered her to Denmark, and she was imprisoned in Copenhagen more than 20 years. Her memoirs, partly autobiographical,

revealing the injustice practised on her, and her sufferings, translated into English by F. E. Bennett, were published in London in 1873.

III. Christian VII., born Jan. 29, 1749, died March 13, 1808. He was the son of Frederick V. and Louisa, daughter of George II. of England. He succeeded his father Jan. 13, 1766, and soon after married his cousin Caroline Matilda, sister of George III. of England. A year after his marriage he set out to travel abroad, leaving his young wife at home, and visited Holland, Germany, France, and England. In 1769 he returned to Denmark, and found the affairs of his kingdom deranged, the finances low, and commerce failing; but, incapable of attention to business, he abandoned the direction of his government to unworthy favorites. At first he appeared desirous of confiding chiefly in his late father's minister Bernstorff, whom he raised to the dignity of count. A young noble named Holcke at this time, however, enjoyed the greatest share of his confidence, together with a physician, Struensee, who had accompanied him in his travels. The queen, regarding Holcke as her enemy, encouraged Struensee to supplant him in the royal confidence. By his aid the queen succeeded in recovering her husband's favor, and at length procured the banishment from court of Holcke and his equally obnoxious sister. Meantime the queen dowager, stepmother of the king (Juliana Maria, daughter of the duke of Brunswick-Wolfenbüttel), had begun to intrigue in behalf of the interests of her son, the king's half brother; and upon the birth of a crown prince (afterward Frederick VI.) the breach between the queen and her stepmother was hopelessly widened. The king gave daily proof of increasing folly and unworthiness. Bernstorff was dismissed; the council of state, the last surviving check upon the royal authority, was suppressed; and Struensee, possessing a greater ascendancy over the king than any preceding favorite, ruled Denmark with an iron hand. He was ennobled, and empowered to issue his master's verbal orders in writing without the royal signature. Many of his measures were wise and just, but his power was at length exercised imprudently. The nobles were already exasperated by his decrees against their privileges; and a law ordaining the liberty of the press, by which he hoped to gain greater popularity, had a contrary effect, as his enemies thus obtained means of exposing and vilifying his ambitious proceedings. On Jan. 16, 1772, the machinations of the queen dowager were crowned with success. Struensee and the queen were arrested on a warrant forced from the king for a pretended conspiracy, the former beheaded, and the latter sent into exile. (See CAROLINE MATILDA.) The queen dowager now governed the kingdom for many years in the name of the king, whose mind sunk beneath these alarms and agitations. Disease brought on by intemperate indulgences had early undermined his men-

tal health, and his further reign was but nominal. In 1784 his son Frederick, supported by the nobles, succeeded in subverting the power of the queen dowager, and became in fact sole regent of Denmark. In 1807, on the bombardment of Copenhagen by Lord Cathcart, Christian VII. was conveyed to Rendsburg in Holstein, where he died. **IV. Christian VIII.**, nephew of the preceding, born Sept. 18, 1786, died Jan. 20, 1848. He was governor of Norway when the treaty of peace of Kiel, ceding that country to Sweden, was repudiated by the Norwegians (Jan. 28, 1814). Christian came forward as the champion of the national independence, assembled an army of 12,000 men, convened a diet at Eidsvold (April 10, 1814), where a constitution was signed (May 17), and was proclaimed king of Norway under the title of Christian I. (May 29). But, unable to maintain his position against the claims of Sweden, which were supported by the allied powers of Europe, he was compelled to conclude a truce at Moss (Aug. 14), and to relinquish the Norwegian crown (Oct. 10). He now devoted himself to artistic and scientific researches, and in 1832 he was elected president of the Copenhagen academy of fine arts. On the death of Frederick VI. (Dec. 3, 1839), he ascended the Danish throne, and was crowned under the name of Christian VIII. (June 30, 1840). The Danish liberals, who had already yearned for reforms under Frederick VI., now became clamorous and demanded a liberal constitution and the settlement of the Schleswig-Holstein question. The king, although at first reluctant to yield, eventually issued a letter (July 8, 1846) in which he declared Schleswig and part of Holstein indissolubly united with Denmark. The serious complications, however, which arose out of this question, could not be settled by the king, who died shortly before the outbreak of the revolution of February, 1848, and was succeeded on the throne by Frederick VII., who died in 1863, and was succeeded by Christian IX., son of Frederick, duke of Schleswig-Holstein-Sonderburg-Glücksstadt, born April 8, 1818. The second son of Christian IX. was made king of Greece in 1863 as George I. His daughter Alexandra became in the same year the wife of the prince of Wales. Her sister Dagmar was betrothed to the crown prince of Russia, who died in 1865; and in 1866 she married his brother Alexander, the present crown prince. Another daughter, Thyra, was betrothed in 1873 to Prince Arthur of England.

CHRISTIAN, archbishop of Mentz, born at the beginning of the 12th century, died in 1183. He is chiefly celebrated for his military exploits under Frederick Barbarossa, for whom he opened the way to Italy in 1161. On May 30, 1167, he defeated with a small band of 1,000 Germans a much superior Roman force near Tusculum, and seized Civit  Vecchia. After the coronation of the emperor at Rome, Aug. 1 of the same year, Archbishop Christian's task was to subdue Tuscany and the Romagna.

The town of Pisa, which rebelled against his authority, was deprived by him of all its privileges and put under interdict. At the beginning of 1174 he besieged Ancona by land, while the Venetians blockaded it by sea. Peace was established between the emperor and the pope, Aug. 1, 1177; but the archbishop, carried away by his desire to subdue the only party which still held out against the emperor, and which had its headquarters at Viterbo, continued the war, and finally fell into the hands of the leader of that party, Conrad of Montferrat, who detained the warlike prelate in the prisons of Acquapendente till 1181, when he was ransomed. Hardly had he recovered his liberty when he again took up the sword, and fell in battle endeavoring to rescue Pope Lucius III. from the attacks of hostile Roman armies.

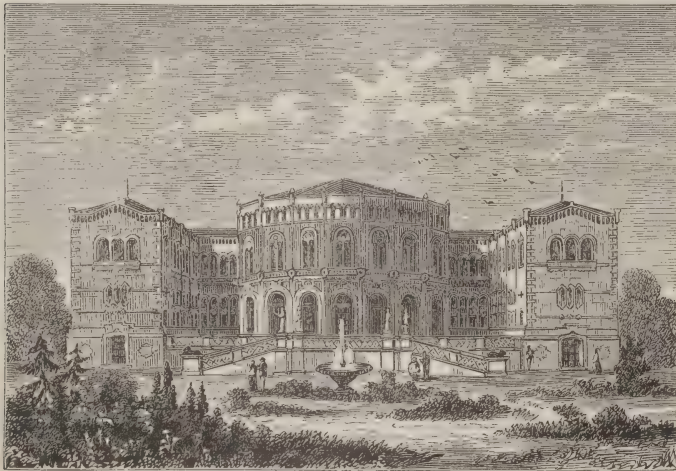
CHRISTIANIA. I. A province of Norway, bounded E. by Sweden, and S. by the Skager Rack; area, 11,000 sq. m.; pop. about 500,000. It is covered with mountains, contains the Mj sen, F mund, Tyri, and other lakes, and is traversed by the Drammen, Glommen, and numerous other rivers. Limited quantities of cereals are produced in the small valleys, and cattle and horses abound. The mineral productions include iron, copper, and silver. The principal article of trade is timber. The province was formerly known as Aggerhuus, the present designation of a district. **II.** A seaport of Norway, capital of the province and of the kingdom, situated at the head of a fiord, in lat. 59  55' 20" N., lon. 10  44' 45" E., 250 m. W. N. W. of Stockholm; pop. in 1870, 66,657. The fiord of Christiania, an arm of the Skager Rack, extends inland about 75 m. The streets are broad, the houses chiefly of brick stuccoed. The new palace, Oscar's hall, occupying a fine site a short distance beyond the city limits, was completed during the reign of the late king Charles XV. The university was founded in 1811; the number of students is between 700 and 800; the library contained in 1871 more than 150,000 volumes; and there are belonging to the institution museums of mineralogy, zo logy, northern antiquities, and botany, and an observatory. There are high schools, a school of drawing for workmen, and a normal school for teachers; several learned societies; commercial, naval, and military schools; an art union, and gallery of paintings of native artists; a national gallery with several treasures of art, and a theatre. Among the principal public buildings are a cathedral, four churches, a council house, exchange, military hospital, and two orphan asylums. The new lunatic asylum occupies a large building, and is arranged on the best modern principles. Among the charitable institutions is one for vagrant and homeless girls called the Eugenia institute. At the southern extremity of the town, occupying a slight elevation, and commanding the harbor, is the ancient castle of Aggerhuus, in which are preserved the national archives and regalia. The ramparts which formerly surrounded the town

have been converted since the peace of 1815 into public promenades and gardens. The prosperity of Christiania dates from the peace of 1814, since which time its population has more than quadrupled. A railway from Christiania to Lake Mjösen, bringing some of the most populous and productive parts of the interior into direct intercourse with the sea, has been in operation since 1849, and an electric telegraph communication with London since June, 1855. The manufactures are inconsiderable, consisting mainly of hardware, glass, woollens, cotton, cordage, tobacco, and corks. The exports in 1871 amounted to \$2,608,442, of which lumber, oats, and cotton yarn were the principal articles. The imports were \$96,460,293, of which cotton, rye and barley, coffee, woollen goods, sugar, coal, pork, and tobacco were the principal articles. The entries into the port were 264 steamers, of 86,732 tons, and 1,330 sailing vessels, of 176,121 tons.—The nu-

less, the loss being estimated at \$1,100,000. Since that time a great improvement has taken place in the architecture of the dwellings, many of which are of large dimensions. The *Christiania Intelligentsedler*, founded in 1763, is the oldest Norwegian newspaper.

CHRISTIANITY, that system of religion of which Christ is the founder. What was accomplished by his Spirit through the apostles and others is to be referred to him no less than that which was performed by his own direct agency. Viewed in the light of its immediate cause, it was the infinite love of God, embodying itself in Christ and working out redemption for men. Considered as an act making provision for the restoration of men, it was the manifestation of a divine and perfect being in human flesh, a condescension to our condition in order to exhibit a life of sinless perfection and of complete self-sacrifice, as the means of liberating from the power and curse of sin all

who should willingly enter into his spirit and adopt his principles of action. In its essential nature, it is neither a system of doctrines, nor a collection of historical facts, nor a code of morals, nor a body of religious observances. It is all this and much more. It is a new-born heavenly life, emanating from Christ, conformed to his example and to all truth, embracing all virtue, intimately blended with nature and history, and manifesting itself in acts of homage to God and of love to men. The germ of all its positive principles was con-



The New Storting House.

deus of Christiania was the ancient town of Opslo, east of the present city, founded in the 11th century. In the beginning of the 14th century the fortress of Aggerhuus, the first building within what is now the city proper, was erected. In 1523, and again in 1567, Opslo was burned by the Swedes. It was again burned in 1624, when King Christian IV. founded a town around the fortress of Aggerhuus, to which the inhabitants of Opslo soon removed. A wall with bastions was afterward built. In 1630, and again in 1654, half of the inhabitants died of the plague. The great London fire of 1666 laid the foundations of the trade of Christiania, by creating a demand for Norwegian lumber. In 1716 the Swedes took possession of the city, but were driven out in six weeks, after which the fortress was much strengthened. In 1858 a fire took place in which 60 buildings in the centre of the town were burned, and 1,000 people rendered house-

tained in the person, character, and life of Christ. The complete development of this, and its application to all the relations of life, would constitute practical Christianity as it was designed to be, and as it will be when it shall be conformed to its ideal standard. Christianity in such a sense reveals itself in every phase of humanity, whether individual or social. It reaches further and comprehends more than the church. The latter does not embrace the state, but is rather its counterpart. The church and the state represent two aspects of human life, the religious and the secular. Christianity relates equally to both. The state is to be Christian, but not ecclesiastical. Philosophy, science, literature, art, business, private and social life, are all to be Christian, but surely not ecclesiastical. Indeed, if the individual is to be like Christ, inwardly as well as outwardly; if in him a divine principle is to pervade all that is human; if by the grace

of God Divinity and humanity are to be in contact with each other in him, it cannot be otherwise than that Christianity shall extend equally to everything in human life. Every day is, in a certain sense, a holy day, and every act is a Christian act. Such will be the kingdom of God, such Christianity in its complete triumph. But while the church and the state are to be equally Christian, the promotion of Christianity is to be the direct aim of the one, while it is to be only the indirect aim of the other. The activity of the church therefore, being more directly religious and exerted only under religious forms, is often very naturally supposed to be a complete and adequate representation of Christianity. It is owing to this that many writers have erroneously, we think, considered Christianity and the church as identical. Christianity in a subjective sense is the inward life of the individual, answering to the provisions of the gospel made for him and existing out of him. It is a personal, free act of appropriation made under spiritual influence, by which Christ is received, in his entire character and spirit, in his offices, and in his work, as our redeemer, teacher, and example, and, in short, as our life. This act involves the renunciation and abandonment of whatever is opposed to the spirit of Christ, and a heartfelt sorrow for all previous participation in it, which is the negative side of Christianity; and on the other hand, confidence in God as a loving and merciful Father, and trust in Christ as the medium of God's redeeming love to men, which is the positive side. Supreme love to God is the radical principle of Christianity, as the religion of the heart; and love to men, not only as a sentiment, but as a practical energy expending itself in self-denying and self-sacrificing efforts for their good, in the spirit and after the example of Christ, is the necessary and invariable product of that principle. Hence, in the matter of personal religion, he who is without love is nothing. This inward spiritual life received from Christ may not be perfectly realized and wholly conformed to his at any given moment of our present existence; but it is received in its seminal principles as soon as Christ is received, and the development will go on till it reaches perfection in the world to come. The progress of the individual in this divine life is in proportion to the will and the effort which he gives to it. While on the one hand his Christianity is a gift and a grace, on the other it is a culture and a work. The believer in Christ is not a passive recipient of his grace, but a voluntary, resolute, strenuous agent, a determined, moral hero, who overcomes difficulties and obstacles because he purposed and endeavored to overcome them. Christ helps his disciples when they help themselves, and lives in them when they strive to live in him.—As Christianity is founded on Christ, it will be necessary to delineate those peculiar features of his character which are most essential to it. The one fact on which all

other things in the redemption of mankind depend is that of "God manifest in the flesh." That God was in Christ, and was represented by him, is a fundamental principle in the Christian system, as explained by Christ himself and by his apostles. The incarnation laid the foundation for human redemption. There was thus a second Adam, a new head of the human race—the true man, having a divine lineage, and the Spirit of God without measure, bearing his image and doing all his will, acting in every moment of life with a perfect spontaneousness and freedom, leading a life at once divine and human, avoiding sin and thus passing sentence against it, taking upon him its outward consequences by putting himself in fellowship with the sufferings of sinful men, and in this state of voluntary humiliation and suffering revealing the infinite condescension and love of God to his erring and unhappy offspring. In all this act of redeeming mercy is to be seen the true type of practical Christianity: a holiness that is separate from sin and condemnatory of it; a humility that is unambitious and unpretending, seeking merit and not rank; and a love that seeks not its own, but sacrifices all external things for the good of others. The mystery of redemption by Christ we may not be able to explain; but that a whole embryo Christianity lies concealed in the wonderful life and death of the incarnate Son of God is too evident to admit of doubt. It is the taking of human beings up into fellowship with his human nature, as well as his descending to them by entering their nature, and holding communion with their sufferings, that opens the way for God to dwell in men, and for men to dwell in God. The divine and the human were first harmonized and reconciled in the person of Christ, and from him as a nucleus spreads out, by means of his Spirit, a broader harmony and reconciliation between God and all his children. Such love and such a sacrifice on the one part, and such a reception of Christ and of his divine life on the other, render the method of redemption consistent both with the divine government and with the moral constitution of man. The righteousness of Christ, which is accepted of God, is also accepted on the part of man, as the germ of a new life. In this way every end of a wise government is secured, and man is restored first to the image and then to the peculiar friendship of God. There is one feature of this system that needs to be more fully set forth. It is that view of Christ which presents him as the ideal of humanity. The want of such an ideal of human perfection was deeply felt by the ancient world. To the question, What precisely should men strive to be? no satisfactory reply could be given. Men were far from being agreed in respect to "the chief good;" and in the various theories maintained there was necessarily much vagueness, as nothing but abstract ideas could be presented, a living

model of moral perfection being neither actual nor possible. Even if there could have been a perfect agreement about an ideal existing only in thought, it would have had but little power upon the common mind. It could not have been sufficiently definite and clear for practical purposes. What, therefore, was necessary to constitute a perfect man no one could positively affirm. Certainly, there was in all the speculations of the philosophers no approach to the Christian idea of what man should be. There was in this circumstance a sort of necessity that the idea should be embodied in an individual person of the human species; otherwise it could never be fixed definitely in the general mind as the end of all its practical aims. Had Christianity done nothing more than to exhibit such a human character as that of Christ, still in presenting to the comprehension of all that living image of what human nature should be, it would have accomplished more in the way of teaching virtue than all the other moral systems of the world. All that can be done by the power of an idea has been done by the mere existence of such a person as Christ. The moral character of all Christian nations is precisely what their various attempts to attain to the excellence of this model have made it. No individual has equalled the normal type of humanity; nor has the whole school of his disciples collectively attained to the virtues of its founder. What other example is there in the history of mankind where the single founder of a school has been able to hold such a preëminence over the collective attainments of all his various disciples for successive ages? If human nature was designed, not for a separate and independent existence, but for an existence in most intimate connection with Divinity; if it was to be enlightened, guided, influenced, and moulded by the latter, by having a vital and uninterrupted spiritual union with it, and finding its true destination and well-being only in that state, a life not only from God, but in God, then there is nothing that exemplifies all this in such absolute perfection as the life of Jesus. Here we behold "the Model Man" in his union with God—"I in them, and thou in me." If Christ, besides all his other redeeming acts, has in his life as a man exhibited the just relations between humanity and Divinity by keeping them always in union and harmony, he has made this grand, this most marvellous exhibition for the benefit of human nature at large; and having been accomplished once, it needs not to be repeated. In respect to the fitting time or place for such an exhibition, it may not be becoming for mortals to attempt to judge. But, as we have the divine method before us, it is neither irreverent nor presumptuous to search for the evidences of its wisdom. If it is an event to occur but once, it would seem natural that it should take place in some focal point of the world's history. That it should succeed a

period of the highest pagan culture, so as to show what mere human culture could not do, and should make its appearance in a nation the most favored in respect to religious knowledge, so that the heavenly plant might be put into a prepared soil, the most perfect revelation of God be made to those who already knew most of God, would seem to be both reasonable and appropriate. In this way, it would take up the great problem of the destination of human nature and of human society in that stage of its solution where the world under the most favorable circumstances, as it respects both pagans and Jews, had left it. No doubt, as the western borders of Asia, where the three tides of Asiatic, African, and European civilization met, presented a suitable theatre for the introduction of Christianity, so the period that closed ancient history, and opened the way for a new and very different history in ages to come, may be supposed to enter largely into that assemblage of circumstances which marked the "fulness of time." The greatness of the Christian religion consists in the energy with which it actually impresses that type of character found in Christ upon a great mass of human beings of different countries, and in different ages of the world. This is its greatest peculiarity, viewed as a practical system. Here it stands confessedly alone. Such a power it could not exert unless there was a reality both in Christ's character and in its causal relation to ours. He must have had a divine life in himself, and have been the source of a similar life in his followers. Other founders of religious systems are teachers, authors of institutions, of organizations; or, under mythical forms, they present symbols of what is supposed to be divine. Not one of them, as a historical personage, holds the relation of a vital source, or even of a prototype of all that he expects or desires to see produced in others. Even what Moses was in himself was not a matter of vital importance; little comparatively depended on that. He was not in his own person the standard of what he taught; much less was his spirit the source of religion. Like other good men, he pointed to something higher and better than himself. But Christ was himself all that he wished his disciples to be; and the reproduction of himself in them individually by a spiritual energy was the chief aim of his religion, and his success in this undertaking is its chief glory.—From this conception of Christianity, and of its founder, which may be regarded as a theoretical view, let us advance to a historical estimate of the exalted character of Christ. In what light did he view himself, and in what attitude did he present himself to the world? As the exalted personage in whom were fulfilled all the predictions of the ancient prophets in respect to the Messiah, and in whom was realized in a substantial and perfect form all that was shadowed forth in the types of the Jewish ritual and law. He regarded himself as the

great deliverer of his nation, toward whom all previous history had pointed. For the whole generation of men to whom he appeared he professed to be more important than any or all others. Their moral character was to be tested, and their final state decided, by the reception or rejection of himself as their spiritual guide and Saviour. Nay, more, for all men, and to the end of the world, this preëminence both in a historical and moral point of view was to remain the same. He claimed, in short, to be the one individual on whom the well-being of all men depended. This is certainly a unique position to be assumed by any individual of the human race. If true, there is nothing in history that approaches it in sublimity and importance. How many correspondences does this suppose between himself and a broad sweep of historical events stretching from age to age! If such is his real character, it must be the key to the whole moral and religious history of mankind. Every new century must, with its train of coincidences, confirm the marvellous view. That he actually entertained such a view of himself does not admit of a doubt. The whole history of the apostolic age would be an enigma on any other supposition. The Jews often accused him of it during his public ministry. The general idea, under a great variety of forms, is exhibited by Christ in his public discourses, as reported by the evangelists. The whole structure and argument of most of the epistles presuppose it. The primitive church itself was organized on this as a fundamental principle. What, now, was the effect produced upon society by the appearance of Christ as such a historical character? The first thing which arrests our attention is the stupendous power which he exerted upon the minds of all classes of people with whom he came in contact. With whatever feelings his enemies approached him, they always stood in awe and often in fear of him, after having encountered him. After many attempts by means of argument to strip him of his influence with the people, they clearly saw that nothing but physical force could overcome him. They crucified him because it was not safe for them that he should live. What mortal ever addressed the people with such convincing power as he? We admire the teachings of Socrates as represented by Plato; but what are they compared to the conversations and discourses of Christ as reported by John? We may think that Socrates owes somewhat of his celebrity to the splendor of Plato's genius. We will not deny that it was well that there was such a disciple as John, one so happily fitted to receive and record the peculiar spirit of Christ's teachings. But to suppose that Christ is indebted to John for the loftiness, purity, and simple majesty of his instructions, is only to transfer the marvellous power to another person. It would only make John superior to Christ, which would be not only more unhistorical, but more enigmatical in all

respects than the contrary view. Still more striking was the moral influence of Jesus upon the men whose distinctive character as Christians was formed by him. What were Peter, John, and Paul, as he found them? And what were they as he left them? Think of the rough and dashing Peter as first seen on the sea of Galilee. How subdued and chastened, when the risen Lord said to him, "Feed my sheep." With what power and wisdom does he stand up before the multitude on the day of Pentecost! With what moral elevation, dignity, and completeness of character does he appear at the healing of the lame man at the entrance of the temple! With what respect, veneration, and awe must he have been regarded at the scene of the death of Ananias and Sapphira! Who can read his first epistle, addressed to the dispersed of Israel, without feeling that the touching power of his eloquence came from a soul that had received something beyond what the ordinary experience of life had given it? The transformation of his character is certainly surprisingly great. In tracing the change wrought in the character of John, we have similar evidence of the operation of a superhuman power. At the beginning he is a fiery, ambitious youth, calling for vengeance upon those who teach differently from his Master, and seeking for a position of rank and honor in Christ's future kingdom. After his long and peculiar intimacy with Jesus, how strangely does he appear to be changed into the same image. Was it not the Spirit of his Lord and Master that changed him? Would his natural genius, without any extraordinary influence, have enabled him to write such an angelic gospel as that which bears his name? Who but Jesus of Nazareth made of the misguided, frantic, persecuting Saul the most splendid human character, perhaps, that adorns the history of mankind? Before his conversion it cannot be said that he had such a moral preëminence above other men. Without such a conversion, without the influence of Christianity, though he might have been a man of great natural power, there is no reason to suppose that he would have approached that character which the new religion gave him, and which made him the moral hero of his age. We may safely challenge all the heathen world to present two such men as John and Paul, or a single book of such moral sublimity and beauty as the gospel of the former, or any writings of such religious depth, compass, and power as the epistles of the latter. We have selected these single individuals for the sake of giving a microscopic view, as it were, of the spiritual power of Jesus over the minds and characters of men. If our space allowed us to extend the examination to hundreds and thousands of other individuals, we should find in them as genuine, if not as brilliant, specimens of high moral excellence produced by the power of Christ. What communities ever presented such a spectacle of sublime moral ac-

tion and endurance as the primitive apostolic churches? All the Christian heroes that have lighted up the darker history of many centuries have only renewed the martyr spirit which was exhibited first by Christ on the cross, and then by countless other bleeding victims nobly offered up to God in the golden age of the church. These are only a few of many facts which have a veritable and incontestable place in history, and there is no other satisfactory explanation of them than that of referring them to the mysterious power which Christ exerts upon the minds of men.—If it be objected that the facts on which we rely in construing Christianity are themselves dependent on the authority of the New Testament as an inspired volume, and that this is an undue assumption in a historical argument, we say in reply that we make no such assumption. We take the New Testament writings in this case for just what they are found to be worth as historical documents. Waiving all discussion in respect to their inspiration, we have good reason to say that the epistles of Paul, the writings of Luke, and the Gospel of John have passed the ordeal of the severest historical criticism, and that Strauss himself, the most destructive of all the Biblical critics, while he fluctuates in regard to the last, admits substantially the historical authority of the two former. Let the writings of these three authors be tried by the same rules as those applied to other historical documents, and we think the credibility of their main facts will be called in question by no well informed and sober-minded critic. Their inspiration is not their only title to being received as historical authority. Even occasional errors and discrepancies would not necessarily destroy their authority, any more than those found in Plato and Xenophon destroy the credibility of these writers in their accounts of Socrates. If it be conceded, as it generally is, that the New Testament writings above named, whether inspired or not, are in the main genuine sources of historical information, then the view which we present of Christianity is a strictly historical view, and has a place in the history of the world as much as the expeditions of Hannibal or Alexander.—With this explanation, we proceed. In respect to the method which Christ pursued in beginning the work of the conversion of mankind, we observe something like the following. On entering upon his public ministry, his first aim was to impart his own temper and spirit to a few others, scattering at the same time the seeds of truth among the people. He began by effecting what others before him had failed to do, improving the human heart, and allying it to himself in the bonds of holy affection. His instructions and his acts were means to this end. Among John's disciples, plain and simple-hearted fishermen, he found those who were most susceptible of pure spiritual ideas and spiritual impressions. By gradually forming their hearts to true piety and

virtue, by unfolding to them the nature of his spiritual kingdom, by removing their ignorance, by correcting their misapprehensions, by overcoming their prejudices, by elevating them into his own region of moral purity, simplicity, and truth, by training them to meekness and humility, and at the same time to the most exalted moral heroism, to a supreme regard to the will of their heavenly Father, and to an unlimited confidence in him and contempt of the world, the Divine Teacher moulded the character of his disciples till it resembled his own, and prepared them to propagate the same spirit and principles in all the world. The apostolic office was not arbitrarily conferred, but was given to those who had been sedulously trained for it. His public ministry was as remarkable in its character as was his private training of the twelve. While he was chiefly concerned with the profoundest truths, and the most comprehensive and far-reaching principles, his manner of teaching was inimitably natural and simple, growing out of the incidents and occurrences of life, or called forth by questions arising from them. Whether the matter was more sublime and weighty, or the manner more easy and simple, it were difficult to say. And yet most of his teaching was preparatory to something more complete which was to follow. Prejudices and errors which hung like a cloud upon the mind were broken in upon by degrees, as the darkness of night is by the approaching morning. Important moral truths were stated in their most elementary principles in a living, natural, concrete form. Unwelcome truths, relative to his own future authority and greatness, were more or less veiled in temporary obscurity, till events should set them in a clear light. Facts not yet known, or events near at hand, if they would too much startle the mind and prematurely excite the murderous hostility of men, were hinted at enigmatically in public and then more fully explained to the disciples privately, to be made public only when the proper time should arrive. The crucifixion and the resurrection would make all these things plain. Till then, no small part of Christ's teaching was necessarily obscure. His particular aim evidently was not merely to convert individual men, but more especially to prepare the public mind for the days of Pentecost and for what followed. Never was a plan more evident than that observable in Christ's ministry as introductory to the ministry of the apostles. His teachings were morally the leaven of the succeeding age, pervading the whole mass of society.—Let us now take our stand among the disciples on the day of Pentecost. The image of him whose glory they saw as that of the only begotten Son of God, full of grace and truth, was still fresh in their minds. His miracles, such signal manifestations of divine power and love, had not faded from their vision. His remarkable discourses, as repeated by John, which made the multitude exclaim, "Never man spake like this man," were treasured up as a

precious legacy in their hearts. The scene of the transfiguration, with its obscure symbolical import, had not passed from their memories. His dark sayings, enigmatically expressed before the multitude, but confidentially explained to the disciples, respecting his decease and the glory that should follow his resurrection, were receiving a complete elucidation by a series of the most astonishing facts. Why were the dejected and dispersed disciples now assembled together, buoyant with hope, and burning with fresh zeal? Had not something occurred to produce this change? Could the scene of the Pentecost have opened if the resurrection had not intervened between that and the crucifixion? Could the men, whose worldly fortunes and lives were hazarded by the assertion, have believed and have persuaded even the Jews of Jerusalem to believe that Christ was risen, if nothing, absolutely nothing had been seen or known of him after his public execution? Christ had foretold his death and resurrection. The disciples had seen him repeatedly after his resurrection. He had promised the effusion of the Holy Spirit. They had assembled and waited and prayed for it. The promise was fulfilled. The fulfilment was of the most remarkable kind. Its effects were of the most public nature. The train of circumstances was such, the evidences were so overwhelming, that even those who crucified him were convinced, and added to the disciples. Such events, so remarkable, so undeniable, so public, in the very place where opposition must have had a perfect triumph, and the credit of the disciples must have been completely ruined, by the demonstration of the untruthfulness of their testimony, if Christ had not risen, were a fit preparation for the grand inauguration of Christianity as the religion of all mankind. We do not know exactly what that baptism of the Holy Ghost was, those peculiar operations of the Spirit, those diversities of gifts. But we do know that the expectations of the disciples to whom the promise had been made were more than realized; that their faith was so confirmed as to give them great boldness and to put all their previous doubts to flight; that during the lifetime of their Master they had never had such confidence in their cause, or such courage in maintaining it; and that this enthusiastic ardor did not pass away as a transient day dream, but became the effective and enduring cause of the rapid spread of the new doctrines and of the manifestation of the rarest and most exalted virtues which for three centuries irradiated the world in the midst of the most appalling scenes of persecution. There is no other satisfactory explanation than the one above intimated of the spread of Christianity under the ministry of the apostles, dating from such a time as the period immediately following the crucifixion, and beginning at such a place as the very scene of the crucifixion, among those who were witnesses to it. The vigor of Christianity, as shown then and in all succeeding ages, its power as the

great civilizer of the world, its vitality, which throws off the corruptions of centuries, and perpetually renews itself, its exalted character as the precursor of the mightiest achievements of the human intellect, its unrivalled potency in producing a sterling and substantial morality, its power to solace human griefs, all demand an origin more substantial than myths and sagas, more vital than the dreams of an enthusiast, or the superstitions of an ignorant, credulous populace. The early propagation of Christianity rested preëminently upon an extended group of the most astonishing, and yet the most incontrovertible facts. If the essential facts are not true, the doctrines founded upon them are not true; and both these being abandoned, the splendid fabric of a historical Christianity, the most potent moral agency in the world, remains without an explanation. It would seem that, in an age so imbedded in false views of morals and religion, with a literature, philosophy, art, and government so alienated from the truth, and a life so given over to sensuality and gross immorality, there was need that a nascent Christianity should have a fresh, vital beginning; that, wanting a history and the demonstration of its moral tendencies from the trial of centuries, and all that accumulation of evidence which time has now given, it should be ushered in with a special divine energy, and be advanced by means of extraordinary gifts and aids. Gushing thus as from an overflowing fountain, the stream, which is now spread out into an expanded even volume, might, in its narrower compass, form a deep boiling current, as if rushing from a mighty cataract. As with the individual the first stage of a religious life may be accompanied with feelings intensely fervid, and with an enthusiasm and zeal which are then necessary to surmount great discouragements and obstacles, so Christianity as a whole might properly have a concentration and intensity of power at the outset, for which the far wider though gentler influences of later ages are a sufficient compensation. If the primitive Christians had some aids and evidences which we have not, we have very many which they had not. It was not, however, merely the extraordinary gifts of the apostles and the extraordinary events connected with their ministry that caused the dissemination of the Christian faith. What arrested equal attention and produced equal effect was the character of the professors of the new religion. The purity of their lives, their strict integrity, their firm adherence to the loftiest principles of morality, their disregard of consequences when urged to violate their consciences or their religious vows, their patience under injuries, their forgiving spirit, their magnanimity, their love to each other and even to their enemies, and their benevolent, self-renouncing, and self-denying spirit, made it impossible for the ingenuous among the heathen to withhold their admiration. The Christian life, in contrast with heathenism, was one standing miracle. Christian-

ity itself contained nothing more wonderful or more convincing to its adversaries than the Christ-like spirit of its adherents. Though they were all imperfect, and though some of them fell into errors and into sins, yet we learn not only from the apostolic writings, but from the testimony of pagans, that their attachment to truth, and to the purest principles of morality, and to all the virtues of a truly Christian walk, was such as to present the most striking contrast to what was observed among other people. Connected with this devotion of spirit was the earnestness with which every disciple espoused the Christian cause. Every one was a propagandist. That religion which was all things to them, they wished to communicate to others. They saw men living without God in the world. The same compassion which moved Christ to devote his life to the salvation of men, prompted his followers to render that salvation as availing to all their fellow men as possible. Wherever a Christian went, Christ was preached, and the faith was propagated. A Christian captive was sometimes the means of converting whole communities and nations. The spirit of its founder animated the church, and conversions from idolatry were rapidly multiplied. The age of Christ and of his apostles is the turning point in the world's history. There is no other epoch of equal importance in itself or of equal influence upon mankind. If we ask what has made the moral history of the world gradually improve from that date, no cause so powerful can be named as Christianity. As the industry of man has given a new face to nature, so the spirit of Jesus Christ has given a new aspect to human society. Its influence is so all-pervading that it is difficult to specify particulars. It new-models the individual morally, and elevates him intellectually. It acts upon the family in modifying and ennobling all its relations. The wife and mother is exalted to a nobler sphere, and her position of newly acquired honor enables her to shed a most benign influence upon the family and upon society. The husband and father is a priest in his household, and has more sacred feelings of humanity and tenderness to those whose happiness and fortunes are placed at his disposal. The child, first secured against infanticide, then elevated as a moral being, and educated to Christian virtue, makes the love and respect of parents a part of his religion. And so the whole domestic relation is improved and sanctified by the example and teachings of Jesus. The exaltation of nature which blesses the individual and the family reaches also the state, and teaches it to respect the rights and to seek the well-being of the individual. It no longer makes itself the end and men the means, as in ancient pagan times, but is itself a minister to man as a social being. It recognizes the rights of other nations, regards itself as an instrument for promoting the interests of mankind, and acknowledges a higher aim than its own selfish purposes. Though the state is the last to feel the direct power of

Christianity, it is beginning to consider itself commissioned by the genius of Christianity to do something noble as well as just for the whole brotherhood of man.—It remains for us to sketch the working of Christianity from the time of its establishment to the present. This is not the place to give the details of ecclesiastical history; and yet the influence of Christianity upon the world cannot be portrayed without involving what is most spiritual and vital in the history of the church. It will be convenient to divide the Christian age into three periods: the early period, when the church was oppressed and persecuted, reaching to the time of Constantine; the mediæval period, when the church was recognized as catholic, and was for the most part dominant; and the Protestant period, during which Christendom has been divided into two great parties, and the authority of the church over the state has been greatly diminished. Though the second period has a duration about four times as great as either of the others, in their relative historical importance they stand nearly on a level with each other.—*First period, extending to the year 311.* At the time the apostles were zealously propagating the faith, the age of classic antiquity was nearly gone by. Neither Greece with its individuality, liberty, and intelligence, nor Rome with its stern rule and power of conquest, had furnished anything which could perpetuate social progress and preserve nations from decay. Unless a more potent conservative element could be thrown into society, the prospect was that all nations would share the fate of the great monarchies of the East, every period of great civilization being followed by a relapse into barbarism. Judaism, which was never designed to be universal or perpetual, had done its work, and was already effete. It was easy to see, within a very short time, that if there were any regenerative power which could arrest the tendency to decay, it must be found in the inspiring youthful enthusiasm of the new religion. Instead of the prevailing skepticism, the Christian had a positive faith. Instead of limiting his views to a mere earthly existence, and living after none but selfish principles, he lived for another world, and after another's will. His character and life were hereby ennobled. He knew the worth of the human soul, and would not violate its obligations nor jeopard its interests to please men. He had the loftiest style of character, and was capable of the highest and most difficult virtues. Herein lay the vigor of the Christian cause; and the want of all these things made the whole fabric of the Roman empire but a hollow shell. Hence, in the protracted struggle of three centuries between paganism and Christianity, the one was continually sinking while the other was steadily rising. The class of men of whose existence in any political relations Trajan needed to be informed, gave character to the whole empire under Constantine. Within a third of a century after the death of

all the apostles except John, that is, at the close of the 1st century, Christians were found in nearly all the countries bordering on the Mediterranean sea, especially in Asia Minor, Greece, Italy, and the north of Africa. In the next two centuries not only did churches become numerous in all these countries, but they sprang up, here and there, in nearly all the other provinces of the empire. During this whole period Christianity was opposed, sometimes by unrestrained popular violence, sometimes by the government, and sometimes by men of learning. After the destruction of Jerusalem, Christians being no longer confounded with the Jews by the emperors, and their numbers being now mainly increased by converts from paganism, persecutions were directed against them as Christians. Under Domitian, Christians were punished as traitors. Trajan moderated persecution; Hadrian and Antoninus Pius required that it should be conducted under forms of law; Marcus Aurelius gave a loose rein to the popular fury. Then ensued a period of 70 or 80 years, during which the emperors manifested little interest in the subject, and individual magistrates were left to follow their own inclinations. So much the more severe was the persecution of Decius, the first that extended throughout the empire, to the Christians who had become accustomed to a comparatively easy and tranquil life. After 50 years of interrupted or mitigated persecution followed the second general persecution under Diocletian, which ended with the change of the empire from a pagan to a Christian state. While many men of literary eminence appear to have used their influence against Christianity, Celsus and Porphyry, the former near the middle of the 2d, and the latter toward the end of the 3d century, are the chief antagonists who appeared as authors. The Christian apologists, Justin Martyr, Tatian, Athenagoras, Tertullian, and Origen, put an end to the false and puerile accusations brought against the Christians, and led to this result, that the great question between the two parties now struggling for existence henceforth turned on its real merits. In this period, a distinction appears between the clergy and the laity, as also between presbyter, bishop, and metropolitan; the sees of Rome, Alexandria, and Antioch hold a preëminence above others, and provincial synods are held. The writers of the church directed their attention chiefly to what were denominated heresies. Among these, the various forms of Gnosticism were prominent. Other questions which began to agitate the church were amply discussed in the next succeeding period. The authorities relied on were Scripture and tradition. A lower tone of morality, both in the clergy and in the laity, had in too many instances begun to prevail.—*Second period, from the time of Constantine to that of Luther.* There are three things of most extensive influence that mark this period: the new world of thought opened to the specu-

lations of an undisciplined age, the new attitude of Christianity as the religion of the court and of the state, and the new character of the population of the empire, introduced by the invading armies of the barbarians. These three circumstances enter largely into the causes which gave to the middle ages their peculiar character and condition. The first had operated before. But as the former period was chiefly of a practical character, with but here and there a speculative mind in the first two centuries, and with undeveloped tendencies rather than completed results in the 3d century, there will be more unity in the treatment of the subject by viewing the whole movement together. Nothing ever so extended the field of human thought, or so aroused the capacities of the mind, as the revelation of Christian truth. It came at a time when almost all systems of philosophy were broken down, when men despaired of ever arriving at certain truth, when the age of profound thought had gone by, and everything tended to intellectual weakness, to decay, and finally to gross barbarism. Still, in such untoward circumstances, it gave an astonishing impulse to the human mind. What are all the stupendous systems of Gnosticism but attempts of minds still pagan in a greater or less degree to strike out theories of the universe that should comprehend the mediation between the finite and the infinite, after the idea contained in the incarnation of the Son of God? The new Platonic philosophy itself might never have been developed in Alexandria had not Christianity rendered a new philosophy absolutely necessary. On minds essentially sound and Christian, we see the new scope which Christianity gave to thought in Justin Martyr, Tertullian, Clement, Origen, and Augustine. If it be the province of Christianity, not only to overcome all absolute evil, whether as opposed to truth or to the right, but to bring out and cure all partial evil where error has with it some admixture of truth, and wrong associates with itself some things that are right, we shall not be surprised that in the beginning, when Christian philosophy was as much in its infancy as Grecian philosophy was in the days of Thales and Pythagoras, there were ten heresies for every truth, and that the church was like a shrub from which shoot out bristling thorns at almost every point. We have not space even to name every shade of heresy recorded in the annals of the early church. To say nothing of the Cerinthians, Carpocratians, Valentinians, Ophites, Patripassians, Artemonians, Montanists, Manichæans, Noëtians, &c., of the former period, we have a host of parties more or less connected with the Arian controversy, not only the Arians and semi-Arians, but the Eunomians, Aëtians, Apollinarists, Adoptians, Nestorians, Eutychians, Monophysites, Monothelites, and many others. In the midst of these controversies broke out the Pelagian and semi-Pelagian heresies, as they are

called. Constituted as the human mind is, it would be impossible that two such points as that of the Son of God dwelling in human flesh, and that of the Spirit or grace of God dwelling in the human mind, should not lead to much speculation and discussion in respect to the mode of the union. The scholastic theologians added little on these points to the doctrines taught by Athanasius and Augustine. Indeed, it was their office not so much to discover truth as to confirm the decisions of the church. What most characterized the scholastic age in respect to doctrines was the standing controversy with speculative mystics on the one hand, and numerous sects of separatists on the other. There was scarcely a time when both of these tendencies were not ably represented. When Christianity became the acknowledged religion of the state, the whole outward condition of the church was changed. Politics and religion were henceforth combined. Sometimes the state ruled the church, and sometimes the church ruled the state; but never were both kept strictly within their own bounds. We have only to look into the laws of the Christian emperors and the acts of the bishops to find abundant evidence on this point. At the beginning of this period the imperial court at Constantinople exercised a most decisive influence over the church. Not only were high ecclesiastics often dependent on the emperor, and subject to his will, but even councils were awed by his presence. At a later period, and in the West, the head of the church exercised authority over all Christian states. From the nature of the case, where there is such a union of the civil and ecclesiastical power, the one or the other must rule. There must be a last resort in all cases of collision. Thus, under Constantine, the church obtained protection and support, but in many cases at the expense of its independence. It rose politically and sunk morally at the same time. Piety and learning and missionary zeal retired more and more to the desert. Ambition both in church and state was renounced by the more devout, that in a life of meditation and prayer, and of poverty, after the example of Christ, they might live only for the world to come, and for the spiritual interests of mankind. Many of the greatest and best men of the early church chose this mode of life. In after times monasticism wore a very different aspect. The population of Christendom underwent great changes during the period introduced by Constantine and closed by Charlemagne. While paganism was completely extinguished, and Christianity was carried into Persia and even to India and Abyssinia, the Mohammedan power, taking its rise in Arabia, blotted out Christianity from the map of Asia and Africa, of the eastern church left but feeble remains in Greece and Constantinople, seized upon a part of Spain, and threatened France, and indeed all the borders of the empire except the northern.

Still more were the fortunes of Christendom affected from another quarter. The German races, a more vigorous stock, subdued the degenerate and feeble inhabitants of the empire. The ancient Christianity was almost obliterated, and the loose nominal Christianity of Visigoths, Ostrogoths, Vandals, and Burgundians swept murderously over the south and west of Europe. Afterward the Franks and Saxons, and other German tribes, came nominally into the pale of Christendom, regenerating and invigorating it politically, but pouring into the church a semi-barbarous population, which it required centuries to subdue and civilize. The church had enough to do to manage the half-heathen population which was thus poured into its own bosom. Its missionary work was almost necessarily limited to its own borders. In the conversion of these tribes, the monks of Ireland, England, and the east of France had shown great zeal, and in prosecuting their work a large number nobly sacrificed their lives. But too many among these German tribes were converted either as soldiers at the command of their royal leaders, or as subdued enemies by authority of their conquerors. The banks of the Elbe were for two centuries wet with human gore by such contests between the German and Slavic races. With a population so introduced into the church, it is not strange that the wild, tumultuous character of the middle ages should show itself as much in the church as in the state. Herein lies the cause, if not the justification, of the Roman hierarchy. The concentrated authority of all Christendom, backed by the awful sanctions of religion, was, by the ecclesiastics of the age, deemed necessary in order to hold these fierce spirits in check. Certainly in the first half of this long period the nations of western Europe were indebted in no small degree to the church for the order that prevailed in society. Many other causes, indeed, coöperated to elevate the hierarchy, and to complete its organization. The church, which in the time of the earliest heresies and of the persecutions strove after unity through the bishops and through synods, became in a higher degree a united catholic church under the influence of Constantine and of the general councils. Its organization more and more resembled that of the empire. Single churches governed by their pastors, the churches of the various dioceses governed by their respective bishops, the churches of a province governed by synods and metropolitans, and whole countries governed as patriarchates, all seemed to imply the highest unity in a single head similar to that of the empire. But all these parts of a general organization were not equally complete. The hierarchical system was somewhat variable. In after times some things were retained, some went into disuse, and some received further development. The unity of the church was weakened by the jealousy between the eastern and western churches, and between the Greek pa-

triarch and the Roman pontiff. The bishop of Rome was in the old capital of the empire, and the bishop of Constantinople in the new. The one capital had antiquity on its side, the other the presence of the Christian emperor and his court. When the division of the empire took place, and especially when the Western empire fell and a new Christian empire was established in the West by the Carlovingians, the way was prepared for the complete separation of the Greek and Latin churches, which in the course of time ensued. The new Christian or German empire, called also the holy Roman empire, increased the power of the bishop of Rome in many important respects, but was a check in other respects. The temporal power and authority of the pope were in general increased, but his influence over the clergy in Germany was thereby in point of fact restricted. Both the German church and the Gallican in the course of time had a more or less national character, supported by the emperor of Germany and the king of France, who often arrayed themselves in opposition to Rome. This was the great contest which lasted for centuries. From the 8th century to the 11th the foundations of the papal system were strengthened. From that time to the end of the 13th century the Roman power steadily ascended till it reached its height. Its most elevated point morally was under the pontificate of Gregory VII. (1073-'85), but physically and outwardly under that of Innocent III. (1198-1216). The higher ecclesiastics were more and more secular; they were chosen from the families of princes for the sake of bringing them under the influence of the state. The right of investiture became an important question between the emperor or king and the bishop of Rome. What the former sought to obtain by the appointment of their favorites, the latter sought to nullify by oaths of allegiance. The emperor relied much on his archbishops, often his own dependants; the pope diminished their power by making bishops depend more on himself than on their immediate superiors. Thus, while the higher clergy were more intent on the government than on the instruction of the church, the people became ignorant, and a general deterioration in morals was the consequence. For more than a century before the time of Luther there was a wide-spread sense of the need of church reform. The great writers of the age urged its necessity; the pope admitted it; the emperors authoritatively demanded it; the councils undertook to accomplish it, but all without effect. The motive was one of policy no less than of religious duty; and when the parties came to act together, it was found that their interests clashed, and that they were rather opposed to each other than united in policy. These things, confessed on all hands to be hopelessly bad, were growing worse and worse till the sudden breaking out of the German reformation.—*Third period, from the time of the reformation to the present.* The

seeds of the reformation were sown far back in the darkness of the middle ages. New historical investigations are continually bringing to light reformers before the reformation. Besides the opposition already referred to, partly of a political and national, and partly of an ascetic character, there were in England, France, Germany, and Bohemia many discontented individuals who were not satisfied with the character of the church and of its ministers, were weary of the venality of the higher officers and of the general corruption which had crept into sacred places, and longed for a return to what they deemed the Christianity of primitive times. Among these men Wycliffe was the most eminent. His doctrines were conveyed from Oxford to Prague by travelling students. The way for a movement in favor of reformation in the latter place was furthermore prepared by two or three distinguished Bohemian preachers, and then Huss appeared upon the stage, followed by Jerome of Prague, and kindled a fire which has never since been extinguished. In Germany sprang up those "reformers before the reformation" described by Ullmann, who in their retirement exerted a more silent but hardly less effective influence. When Luther, with Herculean strength, and with means not always the most delicately chosen, took up the work of reform, it was in no small degree the state of the public mind which made his words fly like lightning from one end of Europe to the other. The broadest distinction, perhaps, between Protestantism and Catholicism, is that the one is Biblical and the other traditional; the one maintaining the right of private judgment, the other the paramount authority of the church. The foundation of the former is the Bible alone; that of the latter tradition, as comprehending the Bible and its canonical authority. According to the one theory, the Holy Spirit attends the written word and its ministry; according to the other, it descends through the church, its ministers and ordinances. With the one, the preaching of the gospel is the principal means of edifying the people; with the other, the sacraments of the church, various forms of adoration, sacerdotal offices, and ritual observances, are the means employed. With the one, there is no mediator between the soul and Christ, every believer being himself regarded as a priest, and enjoying direct and unrestricted access to God, through Christ alone; with the other, the Holy Mother and a multitude of departed saints are intercessors for man. Luther and the other reformers put aside all these mediators, in order that Christ might be the only mediator; rejected the authority of tradition, and all institutions and observances depending on it, except those which were tolerated as indifferent; substituted preaching for the ceremonies of the church; and were especially zealous against indulgences, against the mass, and against the authority of the Roman see. They asserted that the Roman church was but a

modified Judaism, a system of law and observances; that personal merit by works took the place of justification by faith. In addition to these and other theoretical differences, and the objections growing out of them, there was a long list of alleged abuses, which the reformers freely used to give point to their invectives. Among these they referred to the profligacy of the Roman court, the simony almost universally practised, the neglect of the Scriptures, the ignorance, idleness, and vices of the monks, the sale of indulgences, the draining of the coffers both of the rich and the poor on various pretences, the saying of masses for the souls of the departed, and the practice of holding religious services in a dead language, and leaving the people in a general state of ignorance, and then taking advantage of that ignorance for purposes of ambition. In the writings of the reformers, and especially in those of Luther, we find a perpetual recurrence to these and similar topics. The reformation commenced on similar principles, and nearly at the same time, in Germany and in Switzerland. Both Luther in Wittenberg and Zwingli in Zürich set themselves openly and resolutely against the sale of indulgences. The clergy, on the other hand, defended indulgences as a part of the established ecclesiastical system, and this controversy led by degrees to a questioning, and finally to a denial of the system itself. Both the reformers insisted on removing from the church whatever doctrines and principles were without foundation in the Bible. They came independently to the same conclusion in this respect, and were thus accidentally united in their opposition to the papacy. But in their positive construction of Christianity they represented different tendencies. Luther was more mystical, and allowed of more historical development in the church. Zwingli and his followers had less feeling, less imagination, less love of mystery, and represented rather the philosophic and rationalistic tendency in religion. The terms mystical and rationalistic are here used in a good sense. Nothing was better adapted to bring out the peculiarities of both orders of mind and types of theology than the question of the eucharist. While both rejected the Catholic doctrine of transubstantiation as unscriptural and unreasonable, Luther adopted a theory, somewhat inaccurately termed consubstantiation, as mysterious and inexplicable as that which he rejected; while Zwingli stripped the whole subject of its mystery, and exhibited it as a plain and simple emblematic rite, just as it is now viewed by most Protestant denominations in this country. The appearance of Calvin at Geneva, and his powerful metaphysical genius, gave a decidedly metaphysical and logical cast to the theology of the Reformed (Calvinistic) church, distinguishing it from that of the Lutheran church. The *Loci Communes* of Melancthon and the "Institutes" of Calvin, the most celebrated Protestant theological productions of the age, favorably represent the ground type, as the

Germans would say, of the theology of the two confessions. Perhaps, in the more logical character of the Reformed churches, as distinguished from the Lutheran, the reason predominating over the feelings, is to be found the cause of their greater individuality in matters of opinion, and greater diversity of creeds in different cities of Switzerland, and in different countries of Europe. The fact is unquestionable that the Lutheran church was much more homogeneous and united than the Reformed. In general the south of Europe remained Catholic, while the north became Protestant; and of Protestant countries, Switzerland and the west were Reformed, while the east, that is, the most of Germany and Denmark, Sweden and Norway, were Lutheran. The Genevan church was the model for France, Holland, Scotland, and in part for England, and consequently for North America. In the opinion of many Lutheran writers, the prominence given to the understanding over the religious sentiment in the Reformed church is the reason why Socinianism flourishes so much more in that church than in their own. The Reformed theologians, in turn, find in the mysticism of the Lutheran theology the cause of that revulsion of which rationalism is the result. We leave these points for others to decide. United as the church and state were in the 16th century, a reformation in religion could not take place without political convulsions. Not only were the Swiss cantons and the German states, especially the northern and western, immediately affected by the religious change, but the political rights of Protestants in general were long and fiercely contested, and were conceded only after the desolations of a thirty years' religious war. By the peace of Westphalia, Protestants were, in respect to political rights, put on an equal footing with Catholics. Up to the time of the reformation there had always been Protestant elements in the Catholic church. Now these were drained off. The last appearance of anything kindred to Protestantism was in the Jansenists, and that was suppressed. The council of Trent established by its decrees an authoritative rule of the Catholic faith, confirming, though in very general terms, the mediæval theology, condemning Protestantism, and correcting some abuses no longer tolerable. It was the province of Jesuitism to make up for the loss sustained by the separation of the Protestants from the church by new conquests to the faith in heathen lands. By the missions of the Jesuits many converts were won in China, Japan, India, and America. At home, in Catholic countries, they have been a kind of standing army of the church. As they were very active and influential in the council of Trent through Laynez, the general of their order, and as their principles, with some slight exceptions, were the principles by which the church was maintained against Protestantism at home, and chiefly extended by means of missions abroad, it is hardly too much to say that up to the time of the suppression of the order in 1773 they were

the true exponents of the spirit that ruled in the Catholic church of that age. They were sacrificed to expediency, and were restored on a change of circumstances. But owing to the continued operation of those causes, in a greater or less degree, which led to their suppression, the nominal restoration of the order does not place it where it was before.—The Lutheran church has felt the influence of time still more than the Catholic. In the controversy between Luther and Erasmus on the liberty of the will, the former carried his church with him; but on the mind of Melancthon and some others the arguments of Erasmus made a deep impression. Before his death Melancthon, no longer restrained by Luther, who was now deceased, put forth views on this subject quite at variance with those held by Luther, and the Lutheran church followed Melancthon rather than Luther. Since the days of the reformers, the principal controversies of the Lutheran church have turned on the question whether the reformation should be further developed and completed, or whether it shall be considered as having received its completion and fixed character from Luther. This question has never been settled for the whole Lutheran church, but the two parties, taking opposite sides, have each contended, and are still contending, for victory. Crypto-Calvinism, the doctrine of Calvin in respect to the eucharist, was introduced into Saxony by the progressive party, which sprang from the school of Melancthon. It was afterward suppressed by the strict Lutherans, and condemned in the "Formula of Concord." The theologians of this school were more rigid in maintaining the authority of human creeds, after the manner of the scholastic dialecticians, than zealous in propagating a spiritual Christianity. As opposite extremes usually produce each other, so this called forth the pietistic school of Spener and Franke, who placed the Bible far above the creeds of their church. In opposition to both these parties sprang up, about the middle of the last century, the school of rationalists, who set aside the authority of all creeds, and acknowledge the authority of the Bible only in a modified sense. After a century of triumph it seems to be approaching its dissolution, and the Lutheran theologians are returning either to their old orthodoxy, or to an evangelical faith founded upon a deeper study and truer interpretation of the Scriptures than was possible before the rise of rationalism. So the parties now stand divided more than ever on the question whether the normal Christianity of the church is that which has been handed down from the reformers, or that broad historical Christianity brought to light by a more extended and more critical study both of the Scriptures and of history.—In the Reformed church, Geneva was as much the centre of influence as Wittenberg was in the Lutheran. The preëminence of Zürich was limited to the lifetime of Zwingli. After his death Calvin rallied the forces of the Swiss

churches, and guided them with unsurpassed ability and energy. Besides, he wrote for all who used the French language, as Luther did for those who used the German. Luther was a practical leader, and controlled alike the thoughts, feelings, and actions of his followers. Calvin, more learned and more philosophic, aimed chiefly to master the intellects of men, and in this lay his great power out of his own city. Luther never wrote so complete a work as the "Institutes" of Calvin, nor are his commentaries so well adapted to all countries and all ages as are Calvin's. The Genevan reformer, though educated for the bar, was much more rigid in his views of Christian morality than was the monk of Wittenberg. Luther, while he aimed to put men right on the main points of morality, was content with the spirit of Christianity, and was quite easy about the particular acts of the individual. He was the advocate of great freedom in the individual, and allowed him to choose his own pleasures and amusements. He was even jovial in his own character. Calvin was just the opposite of all this. The churches founded by these great men differ as much, in respect to freedom or strictness of Christian conduct, as they themselves did. What was called a Christian life in Wittenberg would have been pronounced unchristian in Geneva. While Luther lamented the easy and lax morality of Wittenberg toward the end of life, without any attempt to control it by church discipline, Calvin was in a state of constant warfare with the "libertines" of Geneva in the matter of discipline. These two different types of Christian character are observable in the whole history of the two confessions. The Genevan church maintained its character through the 16th and 17th centuries, but during the 18th it gradually relaxed its theology, and in the beginning of the 19th was decidedly Socinian.—From Geneva proceeded, chiefly through Calvin and Beza, those influences which introduced the doctrines of the reformation into France. During the life of Beza, the Huguenots, as the French Protestants were called, became a numerous and powerful party; but for the greater part of three centuries they were persecuted by the French government. Twenty thousand or more perished in one month. Twenty-six years later, Henry IV., who had been educated in their faith, secured to them a political existence by the edict of Nantes, after which they flourished again in France for nearly a century. They had distinguished schools of theology at Saumur and Sedan, and numbered among their theologians such men as Blondel, Dailé, Bochart, Basnage, Beausobre, and Saurin. By the revocation of that edict by Louis XIV., hundreds of thousands of Huguenots were driven into exile. The refugees filled large cities and districts in several Protestant countries, particularly in the Netherlands and in Brandenburg. Now followed the period of "the church in the desert," during which, in the

Cévennes mountains and other secret retreats, the Huguenots held their stealthy communions. The French revolution again brought them liberty, since which they have experienced the various fortunes to which the people of France have been subject.—The reformation made its appearance at an early period in the Netherlands. But the emperor Charles V., and after him Philip II., resorted to the severest measures in order to crush it out. The people endured this rigor for a long time, and then they resisted, and finally established their independence. The church, henceforth connected with Geneva rather than with Wittenberg, held its first synod at Dort in 1574, and the next year founded the university of Leyden. The most remarkable feature of the church of the United Provinces was the celebrated Arminian controversy. Arminius and others resisted Calvin's doctrine of predestination. The matter was brought before the synod of Dort, and, as most of the clergy had been educated at Geneva, the doctrines of the Remonstrants, as the followers of Arminius were called, were condemned. Though the Arminian church never acquired a position of great influence in Holland, its leading men, among whom were Grotius, Episcopius, Curcellæus, Limborch, Le Clerc, and Wetstein, formed a school of wide-spread and lasting influence in the literary world. The Remonstrants became more and more latitudinarian in their views, and verged toward Socinianism far more than toward Calvinism. The Reformed church in Holland, though softened in the tone of its theology, has undergone much less change in its faith than the Swiss or the German church.—In England the doctrines of the Swiss reformers have had a peculiar fortune, owing partly to political and partly to other causes. The attitude of Henry VIII. toward Luther was unfavorable to the introduction of Lutheranism into England. Distinguished theologians from Strasburg sympathizing with the Swiss reformers, of whom Bucer and Peter Martyr are most known, were employed to aid Cranmer in carrying forward the work of reformation under Edward VI. Mary's troubled reign followed. English Protestants fled to the continent, where they became acquainted with Calvin and the spirit of the reformation introduced by him. On Elizabeth's accession to the throne, the reformation, begun by Edward, was carried through mainly on the principles of the Reformed church in respect to doctrines, but modified by Lutheran principles in respect to ecclesiastical organization and the ritual. Not that the Lutheran church government and liturgy were copied, but that Luther's theory in respect to the extent to which the ancient usages of the church might be retained was adopted. The church of England merely retained a little more both of the liturgy and of the government of the Catholic church than the Lutheran church did. It may be said in general terms that the Anglican church is eclectic,

combining Calvinistic, Lutheran, and Catholic elements, while the Puritans of England adhered more strictly to the Reformed church. In England the history of Christianity and the history of the government are so connected that the one cannot be understood apart from the other. High-churchism and torism go hand in hand, while the moderate party and the dissenters favor the progress of liberty. England, too, has had its crisis of unbelief. The English deists exerted great influence both in their own country and in other countries of Europe. But in no country has the church been truer to herself in the defence of Christianity than in England. More eminent, perhaps, in antiquarian than in Biblical learning, she presents a body of Christian literature which, as a whole, will bear comparison with that of any other country. The bishops of England have in this respect been outdone by the prelates of no other church.—Nowhere have the principles of the Genevan church been carried out more fully than in Scotland. Knox not only knew Calvin and his followers intimately, but deeply sympathized with them. He was a Presbyterian by nature and by temperament as well as by conviction; and the Scottish character in general, with its metaphysical tendencies, seems to be adapted to that type of theology and that form of religion. The Scottish church has maintained much of its original character through all the changing scenes of its history. It could neither be terrified by the Stuarts, nor bribed by pecuniary rewards or honors. The present Free church of Scotland is but a single specimen of the spirit and courage with which it has always been accustomed to face difficulties and dangers. The tendency to unbelief manifested in Edinburgh a generation ago was happily arrested by Chalmers, who was an ornament and a bulwark of his church.—Though scarcely any church of western Europe is without its representatives in the United States, the great bulk of the early emigrants to this country belonged to some one of the numerous branches of the Reformed church. Nearly all these churches have undergone some modifications in this country, more perceptible, perhaps, to Europeans than to ourselves. It is a common remark of intelligent foreigners, that with all the diversities of Christian sects among us, there is a general resemblance, apparently growing out of the entire freedom of religious development in our country. An ardent love of religious liberty, shared by all Christian denominations in common, a freedom from all entanglements with the state, and a strong aversion to the union of church and state, distinguish American Christians, and separate them widely from those of any other country. Hence, with all the diversities of creeds and forms of worship, there is not only a very catholic spirit, but a marked sentiment of Christian union, showing itself in harmonious action in cities and towns where different communions are thrown to-

gether, and in formal coöperation in societies of Christian benevolence. The relative position of the various Christian denominations in this country has greatly changed during the past century. The orthodox Congregationalists, less predominant in New England than formerly, have spread by emigration into the western and middle states. They now constitute but one branch of the old church, the Unitarians constituting the other and more rationalistic branch. Indeed, the theology of the Congregationalists of New England is never so perfectly settled as that of some other denominations. Every half century and every important locality has had its school of theology. This is not said in reproach. It is the natural and necessary result of giving to the intellect so great prominence in religion. The same cause not only prevents a "dead orthodoxy," a stagnation in theology, but makes them a highly intellectual and enlightened body of Christians, the best friends of learning and of education in general. The Presbyterians, having settled at first in the middle and southern states, consisting mostly of emigrants from Scotland and the north of Ireland, seem also to have in some degree a local habitation. The bulk of their population and their strength is still in those states. They expand, not in the direction of New England, but of the western states. Like the Congregationalists, most of the different branches of Presbyterians have maintained an educated ministry, who have exerted a very great influence. The reunion of the Old School and New School Presbyterians in 1870, after a separation of more than 30 years, is one of the most noteworthy events of our time. The Episcopal church, which was somewhat checked by the revolutionary war, and was somewhat local in the beginning, is constantly manifesting fresh vigor and showing its power to go wherever wealth and refinement invite it. As in England it originally took an intermediate position between the Calvinists, Lutherans, and Catholics, so in this country at the present day it avoids all extremes in theology, and holds a sort of middle ground between the pietistic sects and their extreme opposites. Avoiding theological discussion, both in books and in the pulpit, giving less prominence to preaching than most other Protestant communions, the Episcopalians aim less at profound erudition than the Congregationalists and Presbyterians in preparing their candidates for the ministry, and consequently place less dependence on theological seminaries. In this respect they follow the example of their English brethren. But it must not hence be inferred that they have not an educated clergy. On the contrary, their clergy are generally accomplished scholars, but their study is more in the line of English literature, and in the rich literature of their own church, than in exegetical and doctrinal theology. An educated man rarely hears anything offensive to his taste in the discourses or other religious

services of an Episcopal clergyman. The Baptists and Methodists, though small in numbers at the first, have had a large increase from the common people in all parts of the country. Though differing in their creed, in their organization, and in their forms of religious service, they both lay great stress upon the experimental element in religion. The religion of the heart, drawn out distinctly in individual experience, they have always placed far above the religion of the intellect. Hence they have never made learning a requisite for the ministry. Though they have made great progress in education, and are no longer limited to the lower or even middling classes in the community, still their great strength lies in these classes. The Baptists are more nearly allied to the Congregationalists, both in doctrine and in practice, and the Methodists to the Episcopalians in church government, and to the Moravians in their religious spirit. In point of numbers they are the largest of the Protestant denominations. The Universalists, whose distinctive tenet is the final salvation of the whole human family, have made their appearance in American ecclesiastical history since the middle of the last century, and have received numerous accessions from most of the above named Christian sects.—The Roman Catholic church, as represented by the highest authorities in that communion, maintains her prominent position in Christian history. During the last three centuries she has been forced by the Protestant movement to pass through a severe ordeal, in which all her constituent elements were put to the test; but, as they believe, she has emerged from the trial with undiminished vigor and brightness. Soon after the reformation had proclaimed that free private judgment was the right of man and the rule of faith, she was called, even more perhaps than Protestant communions, to defend the system of revealed religion against the assaults of infidelity and atheism. Subsequent to the breaking out of the French revolution, she was subjected in France to indignity and oppression from the civil power; her priests were scattered or put to death, bishops were exiled, popes were abducted and thrown into prison; but she came to see her adversaries baffled, her claims recognized, and her hierarchy restored. She has since endured the sorrow and waste of social and civil warfare in every one of her ancient possessions, and the loss of the pope's temporal power in Rome; but, as her disciples contend, modern innovation has been able only to retard her life march for brief intervals. They still further allege that her growth and expansion in most Protestant countries cannot be denied, while in Catholic nations a daily increasing number of the faithful are devoting themselves to the strict practice of her law and the upholding of her authority. Though, in her collision with modern political and social systems, she, unlike other organizations, has been forced to

no change of principles, she has nevertheless been able to throw off many old abuses and alliances that served more to encumber than to adorn her. This self-reforming and self-renovating power is claimed by Catholic writers as a proof of the constitutional strength of that church, and, combined with unity of faith, sanctity in moral teaching, universality in time and place, and unbroken apostolic succession, as a mark of the Divine presence. The present condition of the Catholic church, as they hold, is inferior to no period of her past history, in the learning and efficiency of her clergy, in her many educational establishments, her missionary enterprises extending over almost every portion of the known world, her active associations for the exercise of every form of Christian benevolence. America, according to views recently propounded in this country, offers a new field to the ancient faith for the display of its diversified energies. Here, for the first time in the world's history, the Catholic church finds herself free from all entangling alliances with the civil government, and thus avoids a great source of distrust and dislike on the part of her opponents. Here, persecution, if it should occur at all, either for or against her interests, would be the result of transitory passions, not of the system of government by which the country is ruled. Here, the very conservatism which in the old world has made her so many enemies is claimed as a title to respect, in view of the necessity of vigorous principles to counteract the impetuous rush of unrestrained political freedom, and the often erratic intellectuality of a transitional and protesting age. In the United States the progress of the Roman Catholic church is evinced by the large army of ecclesiastics who have gradually spread from the solitary cathedral in Baltimore, where Carroll exercised episcopal functions, to the most distant parts of the land; by the numerous churches, schools, convents, asylums, and hospitals that she has everywhere erected; by her incessant labors among the great mass of emigrants who are sent to her door by the policy of European governments; by the frequent accessions to her ranks from the strictest anti-Catholic communions; and by the first fruits of a Catholic literature which is believed to promise largely for the future.—What conclusion in respect to the future can be drawn from the history of the past? Has Christianity a prospect of perpetuity and increase, or is it threatened with decay? It must be remembered that Christianity is not wholly limited to the church. Many elements of its power are felt elsewhere. The philosophy of government at the present day is preëminently Christian. The theory of human rights and of social progress differs from ancient theories in having a Christian basis. The literature of the civilized world is more and more a Christian literature. A Christian philanthropy is breathed into poetry and romance, as well as

into social and political life, more than in any former age. The public sentiment is deeply imbued with the principles of a Christian civilization. Christian nations and races of men are the dominant nations and races of the earth. Christian civilization at this moment, more than ever before, seems destined to spread over all Asia, Africa, and the islands of the great oceans. The paganism of the world is evidently to share the fate of the paganism of the old Roman empire, to fade away before Christianity, and become a mere matter of history. Is it probable that in Christendom itself Christianity will be compelled to yield to philosophical skepticism? Never did Christianity stand stronger in England than after its contest with deism. Never did the philosophic mind of France grasp it with more power than after atheism had spent all its force. There probably was never a time nor a country in which a historical Christianity could be maintained against the fiercest assaults of a skeptical philosophy with such a convincing power as in Germany at this time. That false rationalism which is essentially at variance with Christianity, deistically denying whatever is supernatural, has been already overcome. Nowhere, during the whole history of the church, has the defence of Christianity been conducted with such critical learning and philosophic power as in Germany, by the great theologians of the present century. Such a historical groundwork of Christianity as Neander has presented to the world in his history of the church, it is vain to look for in any former age. Indeed, history now, civil as well as ecclesiastical, is the impregnable fortress within which Christianity is securely intrenched. All the lines of philosophic history now converge in Christianity. Will the influence of sects and parties destroy the efficacy of Christianity? In respect to these, there is not only change but progress. It has become a pretty generally received opinion among the leading men of all sects, that the whole truth is to be found in none of them; that each is working out some problem, more or less important, to be adopted ultimately by all; that a more comprehensive view of Christianity will be possible after the good and evil in every system have distinctly made themselves apparent to the whole world. The greatest men of the age are already striving more philosophically and more satisfactorily to answer the fundamental question, "How is Christianity to be conceived of as a whole?" The old theological conceptions of it are found to be inadequate in many particulars, chiefly by defect. The theologians were at fault sometimes in their metaphysics, sometimes in their criticism and interpretation of the Bible. Christianity is many-sided. The old theological systems were all more or less one-sided. One aspect of this great subject, it would seem, was supposed to comprehend the whole. A broader and more comprehensive study of the subject

was demanded. The accumulations of learning made during many generations needed to be more exactly analyzed and more carefully tested, and then classified on a much broader scale. All the approximations that have been made toward a clear and comprehensive view of the whole subject were to be studied with reference to a still greater enlargement. It is the manifest tendency of the public mind in this direction that distinguishes the present age. There is a reaching after a universal and complete Christianity—that is, the true historical Christianity, not the limited, partial Christianity of a particular school. Almost every party shows a disposition to appropriate whatever of truth or of excellence may be found in any other party. All seem to aim at a wider grasp of Christianity as a whole.

CHRISTIANS (the first syllable is usually but improperly pronounced as in Christ), or **Christian Connection**, a Christian sect which arose in the United States near the beginning of the present century. At their organization they adopted the appellation Christians as their only name, declared the Bible their only authoritative rule of faith and practice, and extended their fellowship to all Christians, irrespective of creed or party. They originated simultaneously in the east, west, and south, their three distinct sources having at first no knowledge of each other. In North Carolina, in 1793, a secession took place from the Methodist Episcopal church, on grounds of church government; and the seceding body, at first known as "Republican Methodists," subsequently, through the influence of the Rev. J. O'Kelley and others, adopted the name of Christians. The second source was in New England, chiefly in Vermont. In 1800 Dr. Abner Jones, Elias Smith, and other members of Baptist churches, becoming dissatisfied with sectarian creeds and denominations, proposed the principles now held by the Christians. The first church organized by them was in Lyndon, Vt., and many churches had been founded as early as 1804. In 1808 the "Herald of Gospel Liberty," one of the earliest religious newspapers in the United States, was first published by Mr. Smith. The third source had its seat in Kentucky and Tennessee. After the great revival which spread through the Presbyterian church in those states in 1800, several ministers, among whom were B. W. Stone and D. Purviance, desired broader grounds of union, and five of whom in 1801 withdrew from the synod of Kentucky. They organized a new presbytery, called the Springfield presbytery, formally proclaimed their principles, June 28, 1804, and soon after adopted the name of Christians. The three kindred bodies which had thus, between 1793 and 1804, arisen separately, soon after met in general convention and were consolidated into a single denomination. They are generally Antitrinitarians and Baptists, cherish prayer meetings, Sunday schools, and missionary enterprises, do not confine their fellowship

to the baptized, are congregational in church government, and have annual and state conferences, and a quadrennial general convention. When the war interrupted the connection of the southern with the northern conferences, the former organized the "Southern Christian Convention," which in 1873 still maintained its separate existence. Among their more prominent clergymen and writers may be mentioned Walter, Clough, Badger, Millard, Ross, Summerbell, Holland, Kincaid, and Plummer. Their institutions of learning in 1872 were the Christian Union college, at Merom, Ind.; the Wolfboro academy, at Wolfboro, N. H.; Starkey academy, at Eddytown, N. Y.; a Biblical school, likewise at Eddytown; and the Le Grand Christian institute, at Le Grand, Iowa. In 1872 there were in the northern states and Canada 65 conferences, 997 ordained and 201 unordained ministers (in 62 conferences), 1,074 societies with 552 church edifices (in 60 conferences), 56,958 members (in 59 conferences), and church property valued at \$908,775; in the southern general convention, 72 ordained ministers, 18 licentiates, and 10,581 members. The "Herald of Gospel Liberty," united some years ago with the "Gospel Herald" of Dayton, Ohio, where it is now published, remains the principal organ of the denomination. The "Christian Sun," published at Suffolk, Va., is the organ of the southern general convention.

CHRISTIANSAND. I. The southernmost province (*stift* or diocese) of Norway, bordering on the provinces of Bergen and Christiania, the North sea, and the Skager Rack; area, 15,400 sq. m.; pop. in 1865, 328,742. It is traversed by numerous mountains and small rivers, and includes many islands. The coast is broken, especially on the west, where it is penetrated by the extensive Bukke bay or fiord, with two branches, the northern and larger being the Nærstrand, and the southern the Lyse fiord. The N. E. district of Upper Tellemarken or Bratsberg is among the most mountainous. The numerous clefts are filled with water, which rushes down in rapids and cataracts with tremendous velocity, and the waterfall of the Rinkan Foss is over 400 ft. high. These waters unite in three streams and fall into the lake of Nord Söen, whence rises a powerful and impetuous river, the Skeen or Brevig. The other chief rivers are the Nid and the Torrisdal. The fine color of the water, the rocky banks, and the whole scenery produce a remarkably picturesque effect. In the southern districts there are large and fertile valleys, and the climate is very mild, considering the high latitude. The principal wealth of the province consists in forests of oak, pine, fir, and birch, supplying materials for making fishing boats and for the export of planks and deals. Lobsters are not found in any part of the world in greater quantities than along the S. coast of this province between Hellesund and Lister fiord. The principal mineral is iron, and the great abundance of fuel offers facilities for smelting it. The population

is remarkable for its hardness, laboriousness, and tall stature. **II.** A city, capital of the province, situated upon a deep bay called Topdals fiord, which makes into the land from the Skager Rack, a few miles E. of the Lindesnäs, or South cape of Norway; pop. in 1870, 11,468. The situation is picturesque, and the town is regularly built. Many of the houses, chiefly of wood, are surrounded with gardens. The cathedral, a Gothic structure of gray stone, is only second in size and interest to that of Drontheim. Ship building has somewhat declined owing to the diminished abundance of timber consequent upon the clearing of some of the forests; but trade and navigation are active. The principal exports are timber, fish, hides, copper, and iron. During the lobster season over 20 smacks are regularly employed in shipping lobsters to London. Tobacco and other articles are manufactured to some extent. The town is defended by a fortress at the entrance to the fine harbor on the island of Odderö, which divides it into two parts. Christiansand was founded in 1641 by Christian IV., king of Denmark and Norway.

CHRISTIANS OF ST. JOHN, Disciples of St. John, Nazareans, Mendæans, or Sabæans, designations applied indiscriminately, and with great confusion, to a sect of religionists now only found in Persia, chiefly in the neighborhood of Bassorah. They are not Christians in any sense, as they assert Jesus to be an impostor, and install John the Baptist in his place. They claim to have existed from his time, and consider their origin to have been on the banks of the Jordan. They account for their present locality by asserting that the Mohammedans drove them away from Palestine, some to Persia, and some to India. They afterward joined the Nestorians to avoid another persecution, and allowed themselves to be called Christians. They were separated again from the Nestorians more than 300 years ago. Critics and historians are divided in opinion as to their origin. Neander thinks that the name Mendæans signifies disciples, and Sabæans, baptizers; and that the sect took its origin from those disciples of John the Baptist who, after the martyrdom of their master, adopted a course hostile to Christianity, and that from them afterward sprung up this sect, formed out of the elements of an older eastern theosophy. Their doctrines are, however, well defined. They consider the Jehovah of the Old Testament a spurious God, and the Christ of the New a false teacher. They consider the world to have been created by gloomy angels, who belong to the kingdom of darkness, of whom there are seven, who inhabit the seven planets, while there is also a kingdom of light, superintended by good angels. Back of these kingdoms, in unspeakable splendor, is the supreme original being, Ferha, and the female principle, Ajar. Darkness triumphs over light, but there is a struggle between the two kingdoms, and through successive revelations to the kingdom of light, and so

to the world, the rule of darkness is to be broken. The Jewish system was not such a revelation; it came from the realm of darkness. So did that of Jesus. But in John the Baptist they hold that the revelation was from the kingdom of light. The means of introducing men to that kingdom is baptism. John they relate to have been born from a kiss of Zachariah. They also say that John himself was married, but that his children sprung out of the Jordan. They have five sacred books, four of them doctrinal, and the fifth on astrology. They consider baptism as the great and only means of forgiveness and salvation. They prohibit mourning for the dead, tolerate polygamy even among the priests, and forbid the "elect," or those advanced to the higher degrees of the faith, to use sensual indulgences, or to sing or dance. They keep a sort of festival resembling the agape of the primitive Christians, and have a singular antipathy to blue color. In the middle of the 17th century, when they first became known through the Persian missionaries, there were supposed to be from 20,000 to 25,000 families of them.

CHRISTIANS OF ST. THOMAS, a branch of the ancient Syro-Persian church, established on the coast of Malabar. They have a tradition that St. Thomas himself preached the gospel to them, and established their church. The earliest certain history we have of the Syro-Persian church is in a writer of the 6th century. It was formed by the union of the excommunicated Nestorians (499) who held to the Monophysite doctrine. In their practices and doctrines they claim to be primitive. They still celebrate the agape, commemorate the Lord's supper with bread, salt, and oil, and anoint the body of the infant at the time of baptism. Their priests shave the head, and are allowed to marry. They use the Syriac language in the liturgy. During the Portuguese occupancy of the country they submitted to the Catholic church; but when the Dutch obtained the ascendancy the Nestorians resumed their ecclesiastical independence, and still preserve it.

CHRISTIANSTAD, a fortified town of Sweden, capital of the län or district of the same name, in the province of Gothland, 262 m. S. S. W. of Stockholm; pop. in 1868, 7,710. It is built upon a little promontory in a lake formed by the Helge-å, 10 m. from Åhus, its port on the Baltic. The town has a good aspect. The crown house, on the N. side of the great square, for government and garrison purposes, a single large church of the year 1628, a lazaretto, a theatre, and school houses are among the principal buildings. The harbor of Åhus is open, but tolerably safe. The trade is chiefly with Lübeck, Russia, Denmark, and England. Much domestic brandy is sent to Stockholm. Christianstad was founded by Christian IV. of Denmark in 1614, the southern part of Sweden being at that time a Danish possession. The place suffered much during the frequent wars between Sweden and Den-



Christianstad.

mark. In 1678 it was nearly destroyed by Charles XI. of Sweden, during his contest with Christian V. of Denmark. It was rebuilt in 1710 and 1748.

CHRISTIANSTED, a town, capital of the island of St. Croix and of the Danish West Indies; pop. about 6,000. It has a good harbor, defended by Fort Christiansværn, and a battery, contains a Danish and an English church, and a bank, and is the chief entrepot of commerce with Copenhagen.

CHRISTIANSUND, a seaport town of Norway, in the province and 85 m. S. W. of Drontheim, on the North sea, at the mouth of the Thingve fird; lat. $63^{\circ} 10' N.$; pop. in 1866, 5,709. It is built upon three islands, Kirkland, Nordland, and Inland, which enclose a singularly pretty harbor, almost circular. The town is invisible from the sea. The houses, uniformly red and of wood, stand in picturesque disorder. The place has a thriving trade, chiefly in cured fish (cod), which is exported to the Mediterranean and the West Indies. It was founded in 1734 by Christian VI. of Denmark.

CHRISTIAN UNION CHURCHES OF THE WEST. See supplement.

CHRISTINA, queen of Spain. See MARIA CHRISTINA.

CHRISTINA, queen of Sweden, the only legitimate child of Gustavus Adolphus who survived infancy, born in Stockholm, Dec. 8, 1626, died in Rome, April 19, 1689. She was but six years of age when her father died at Lützen, and she was early separated from her mother, and sent to be educated under the eye of her aunt, the princess Catharine, sister of Gustavus and consort of the count palatine John Casimir. She remained under his guardianship until the death of her aunt in 1638. The young queen's early education does not appear to have been judicious or effective. The palatine court rather sought its own aggrandizement. The son of the princess, Charles Gustavus, afterward Charles X. of Sweden, was betrothed to Christina during this guardianship. She was educated in deep distrust of the guardians appointed by the diet to have

charge of her youth, and to govern the kingdom during her minority. In 1636 the diet declared its opinion concerning the mode of educating the young queen. Christina herself relates that her father had ordered that she should receive a masculine education. Her tutor, whom he had himself appointed, was John Matthiae, at first a professor in the college of nobles, and afterward the king's court preacher. Her progress in accomplishments of every kind was remarkable. At 18 she read Thucydides and Polybius in the original, and wrote and spoke Latin, German, and French. In council and administration she showed much acuteness; while the grace of her manners and personal demeanor at this period exercised great influence over all who approached her, although she affected rather to slight than to assert outward dignity. Her portrait during the height of her renown was elaborately drawn by Chanut, a French ambassador at her court. "Her countenance," he says, "changes with every change of mental emotion. For the most part she is pensive, and in every change of aspect she preserves something that is agreeable. If she disapprove of a remark made, her face is covered for a moment as with a cloud, which inspires terror. Her voice, usually mild, can nevertheless assume the strength of a man's. Her spirit is filled with incredible love of virtue, and she is passionately fond of honor. She talks about virtue like a stoical philosopher. There are times when she seems to lay her crown beneath her feet." Chanut then praises her gift of comprehension and retentiveness of memory; her love for the society of learned men and scientific conversation; her reserve in the treatment of public affairs, and in council; her valuation of secrecy, and her power to preserve it inviolate; her apparent mistrust, and the difficulty with which she was made to change her mind; her power over the senate and her council of state. She was a great horsewoman, often ten hours at a time in the saddle, and no hunter in her kingdom was a better marksman. Her character was essentially masculine, always avoid-

ing the society of her court ladies, and ever seeking conversation with men. She had a high sense of the value of time, devoting not more than a quarter of an hour to her toilet. Her observers at this time declare that she valued nothing but honor and virtue, and predicted that her extraordinary merit alone would make her reign illustrious, independent of foreign conquest and the valor of her armies. Such was the bright promise of her youth, the more remarkable from contrast with coming shadows. The administration of the regency during the minority of Christina was confided to a council of five members, at the head of whom was Oxenstiern, the chancellor of the late king. The death of this sovereign betokened great changes in the state of Europe. The German Protestants, now without a leader, were at once split up into factions. Their imperialist enemies, though worsted at Lützen (1632), prepared vigorously to renew the war. Oxenstiern was appointed by the Swedish regents to be "legate plenipotentiary of the Swedish crown in the Roman empire, and with all the armies." He proceeded to the theatre of war, and devoted all his great genius to finding resources for the support of the Protestant cause. Christina assumed the exercise of sovereignty Dec. 6, 1644. Her reign was begun most auspiciously under the guidance of the greatest statesman of the age. Her ingratitude was not slow to follow. The last victories of her army in Germany were hailed with rapture at home, and won for the commander his sovereign's cordial and graceful acknowledgments. Torstenson had overthrown the main army of the imperialists under Gallas. The remaining three years of the war were less brilliant in victories, but more remorselessly vindictive than the other periods. The closing year (1648) found France more than ever united with the Swedes. Turenne received orders to support the new Swedish general Wrangel with his whole force. They effected a junction after much difficulty, and carried on a war of utter devastation against Bavaria. Charles Gustavus, the cousin of the queen, arrived from Sweden with reinforcements, and with the commission of generalissimo. Christina had sent him to command the army in order to rid herself of his importunate courtship. He laid vigorous siege to Prague, which must soon have fallen had not the emperor Ferdinand III., dreading this catastrophe and the certain loss of Bohemia consequent upon it, resolved to arrest it by accepting terms of peace. The Swedes and French had overthrown every other power in Germany, and it remained for the emperor to make the best terms he could. Accordingly the treaty of Westphalia, securing Protestant liberty, was signed Oct. 24, 1648, simultaneously in Osnabrück and Münster. Sweden received money equivalent to \$5,300,000 for payment of her troops, and retained possession of Upper Pomerania, Rügen, Lower Pomerania up to the Oder, the delta of this river, with

Stettin, Gartz, Wismar, Bremen, and Verden, all as fiefs of the empire. Christina's desire for peace had been ardent during the negotiations. It was destined, however, to bring her greater cares and anxieties than she had suffered during the war. Throughout her dominions the great conflict left behind it internal derangements so vast that she soon resolved to commit the task to other hands. The war had been totally disproportioned to the forces of the country. A proper distribution of the burden became an insolvable problem. The internal balance of the state was profoundly disturbed, and there needed a creative spirit like that of Gustavus Adolphus to restore it upon new foundations. Oxenstiern had withdrawn from court, having lost favor with the queen. His influence had been eclipsed by unworthy favorites, and although he shortly returned to his post and to the direction of affairs, he failed to satisfy the country; less indeed from the infirmities of great age, as has been said, than from a new order of things which in its operations jostled him aside. The most deserved reproaches have been heaped upon Christina for her capricious and dissolute conduct at this time; but during great trials to which she was exposed, she gave proof of intellect and courage. She had brilliant merits to reward and many wrongs to redress, and the care which she gave to old and wounded soldiers demands great praise. She was young, vivacious, and liberal without stint. The registers of her reign are filled with deeds of alienation of crown property, patents of nobility, tokens of grace and gifts of every sort. But it was soon evident that personal favor was to become the source of benefactions exceeding all others in amount. A young favorite, the handsomest of her courtiers, Magnus de la Gardie, was enriched with an annual income of 80,000 rix dollars in landed estate alone. Other favorites in time eclipsed him. Her father had already offered to Grotius an asylum in Sweden; and Christina invited learned men to her court from every quarter of Europe. Among the number, Descartes was with the young sovereign at 5 o'clock every morning for two months, and the impression which this philosopher made upon her mind has been said to have given her the first bias to skepticism. The origin of her new tendency, however, is with better reason ascribed to her physician Bourdelot, who, having rescued her from a dangerous illness, prescribed gayety of life for the future, and imparted to his patient his own scorn of all religion. This man took the place of De la Gardie, and through him presently all the favors of the throne were dispensed. She was constantly urged by the diet and her council to marry. The prospects of the monarchy now inspired much apprehension; but although her hand was sought by many princes, the queen resolutely declined a matrimonial alliance. Her father had intended her for Frederick William, afterward the great elector of Bran-

denburg. The popular wish was for her cousin, Charles Gustavus, who moreover appears from his own account to have desired to marry her from motives independent of ambition. She made light of his affection, and told him he talked "nonsense—a chapter from a romance." The result was his positive rejection; but at the same time the queen resolved to abdicate the throne in his favor. She forthwith demanded that the diet should name her cousin successor to the throne. Oxenstiern and Torstenson in vain entreated her to abandon this purpose. The resolution naming her cousin successor to the throne was passed; and Oxenstiern, when obliged to sign it, declared that he would rather sign his own death warrant. He foresaw her abdication. One year later she made known this purpose. An independent life in other lands was now Christina's great desire, which was quickened by a fear that if she delayed, her renunciation of the crown would lose the lustre she wished to shed upon it through its perfect spontaneity. It began to be thought that the act might soon be forced upon her by the machinations of her enemies. A revolt was threatened, and Christina, desiring to quell this, and to abdicate voluntarily thereafter, allowed another diet to assemble without communicating to them her resolution. She carried out her purpose in the manner indicated; but the remainder of her reign was employed as though she had determined not to be regretted. Every species of abuse and license became her daily practice. The public treasure was squandered most dishonestly. She declared she would rather see the devil than her secretary with despatches. Months elapsed without her holding a council of state. She created in all 460 new nobles, among them the court tailor. The court was crowded with dancers, comedians, and singers. Ballets, in which the queen danced, and lascivious entertainments of every description, occupied the time of court and council. Public discontent began to rise to a formidable pitch, and at length Christina, in the 28th year of her age, announced that the time had arrived when she should carry out her purpose of abdication. The diet, assembled at Upsal, offered the usual remonstrances, but at length acceded, the high chancellor adding, "If this is to be, then the sooner the better." The solemn act of renunciation was to be on June 6, 1654, and the interim appears to have been spent by Christina in coming to terms in regard to her future allowance of money. The diet assigned her an income of 240,000 rix dollars a year; but before the matter could be definitely settled, it produced some altercation between the queen and council. At the ceremony of abdication Christina appeared in robes of state, with crown and sceptre, and after an address of farewell laid aside, one after the other, the various regalia. Descending then from the throne, she desired to see her successor, Prince Charles, take her place immediately. She

begged him to mount to the royal chair. This he would not do in her presence; but after attending Christina to her chamber, he returned to the great hall, and was crowned forthwith. Oxenstiern wept as the queen departed. "She is daughter still of our great Gustavus," he exclaimed. Twelve ships of war had been equipped to convey her across the Baltic; but she took her way by land to Denmark, dismissing all her Swedish attendants except four. On reaching a brook which then formed the southern boundary of Sweden, she alighted from her carriage, and leaping across it, she cried out, "Now I am free and out of Sweden, which I trust never to see again." Her country, however, soon became more estranged from her than she from it. Twice she revisited it, and on both occasions she was received and dismissed with distrust, if not with contumely. Carrying with her everything curious or valuable from the palace of her fathers, she abandoned her country as the abode of ignorance and barbarism. She travelled through Germany in the dress of a man, after having embraced the Catholic religion secretly at Brussels. Her public renunciation of Lutheranism was made soon after at Innspruck. The Catholics regarded the fact as a great triumph, while the Protestants were shocked at the conduct of the daughter of Gustavus Adolphus. She was cordially welcomed by the pope, Alexander VII., and at her confirmation by him adopted the name of Alexandra. In 1656 she went to Paris, where she was received with much and various sensation. Her talents and learning were the wonder of that capital. The learned men of Europe continued to be her subjects, as it were; but she seemed to become more and more unsexed. Her masculine air and libertine conversation kept women of delicacy at a distance. Ninon de l'Enclos was the only woman in Paris whom she noticed with any marks of esteem. She offered to mediate between France and Spain; but Mazarin declined the offer, and, under various pretexts, caused her visit to Paris to be shortened as much as possible. In 1657 she returned, and the contempt with which she had now come to be regarded was changed to detestation and horror by a murder which she caused to be perpetrated at Fontainebleau, in the great gallery, almost in her own presence. Monaldeschi, her grand equerry and favorite, was believed by her to have betrayed her confidence. She sent for him, showed him a priest, and told him to prepare for death. The Italian, overcome with terror, cast himself at her feet and begged for mercy; but she, inexorable, ordered Sentinelli, the captain of her guards, to put him to death. The order was executed on the spot. The court of Louis XIV. expressed its displeasure at the act, and during two months she did not show herself publicly in Paris; but the crime was allowed to pass, not only without punishment, but without inquiry. In 1658 she returned to Rome, where she re-

ceived news that her revenue was cut off on account of the war between Sweden and Denmark and Poland. Pope Alexander VII. assigned her a pension of 12,000 scudi, and appointed Cardinal Azzolini to take charge of her finances. Her pride could not brook this state of affairs, and she demanded troops of the emperor to march against the Swedes. Not succeeding in her ambitious designs, she settled down to a life of literary ease and sensual indulgence. In 1660, on the death of the king of Sweden, she went to Stockholm, and began to intrigue for the recovery of the crown, but was compelled to sign another formal act of abdication. In 1666 she visited Sweden again, but found it prudent to return without going to Stockholm. On the death of John Casimir she aspired to the throne of Poland, but the Poles paying little attention to her demands, she returned to Rome and made her permanent residence there. She spent the rest of her life in the culture of letters and in correspondence with learned men, made vast collections of works of art and of books, and founded the Arcadian academy. (See *ACADEMY*.) She bequeathed her fortune to Cardinal Azzolini. She was interred in the church of St. Peter, and over her remains a magnificent monument bears a long inscription, although she had expressed a wish to have these simple words: *Vixit Christina annos LXIII*. Her collections of art were sold and scattered about the world; 900 precious MSS. are in the Vatican, and the most valuable of her paintings were removed in 1722 to Paris, having been bought by the duke of Orleans, regent of France. She left some writings (collected and published by Archenholz in his memoirs of her life, 4 vols. 4to, 1751), which, says Geijer, exhibit a soul ardent and untamed by years, striving in all things after the extreme and the supreme, but submitting at last. "The feminine virtues," he adds in conclusion, "which she despised, avenge themselves upon her good name; yet was she better than her reputation."—See Geijer's *Scenska Folkets Historia*; Lacombe's *Histoire de Christine*, and D'Alembert's *Mémoires et réflexions sur Christine, reine de la Suède* (both based upon the memoirs of Archenholz); Catteau-Calleville's *Histoire de Christine, reine de la Suède*; Grauert's *Christine, Königin von Schweden, und ihr Hof* (2 vols., Bonn, 1838-'42); and sketches in the works of Bayle and Voltaire.

CHRISTMAS (Christ and mass), a festival of the Christian church, observed on Dec. 25 as the anniversary of the birth of the Saviour. Its institution is attributed by the decretal letters to Pope Telesphorus, who died A. D. 138, and throughout the subsequent history of the church it has been one of the most noted of Christian solemnities. At first it was the most movable of the Christian festive days, often confounded with the Epiphany, and celebrated by the eastern churches in the months of April and May. In the 4th century the

urgency of St. Cyril of Jerusalem obtained from Pope Julius I. an order for an investigation to be made concerning the day of Christ's nativity. The result of inquiry by the theologians of the East and the West was an agreement upon the 25th of December. The chief grounds for the decision were the tables of the censors in the archives of Rome; and although, in the opinion of some of the fathers, there was not authentic proof of the identification of the day, yet the decision was uniformly accepted, and from that time the nativity has been celebrated throughout the church on the same day. It has also been a common tradition that Christ was born about the middle of the night. The custom in Roman Catholic countries of ushering in Christmas day by the celebration of three masses, one at midnight, the second at early dawn, and the third in the morning, dates from the 6th century. The day was considered in the double light of a holy commemoration and a cheerful festival, and was accordingly distinguished by devotion, by vacation from business, and by merriment. During the middle ages it was celebrated by the gay fantastic spectacle of dramatic mysteries and moralities, performed by personages in grotesque masks and singular costumes. The scenery usually represented an infant in a cradle, surrounded by the Virgin Mary and St. Joseph, by bulls' heads, cherubs, eastern magi, and manifold ornaments. The custom of singing canticles at Christmas, called carols, which recalled the songs of the shepherds at the birth of Christ, dates from the time when the common people ceased to understand Latin. The bishops and lower clergy often joined with the populace in carolling, and the songs were enlivened by dances and by the music of tambours, guitars, violins, and organs. Fathers, mothers, sons, and daughters mingled together in the dance; if in the night, each bearing in his hand a lighted wax taper. Many collections have been made of these naïve mediæval carols which filled the hours between the nocturnal masses, and which sometimes took the place of psalms in the churches. Of perhaps the oldest of these collections, only a single leaf remains, containing two carols, preserved in the Bodleian library, in a volume of "Christmas Carols," printed by Wynkin de Worde in 1521. Davies Gilbert published a volume of "Ancient Christmas Carols," with the tunes to which they were formerly sung in England, and William Sandys made a more complete collection (London, 1833). The carols of the Welsh are especially celebrated, and their *Llyfr Carolan* ("Book of Carols") contains 66, and their *Blodeugardd Cymru* ("Anthology of Wales") contains 48. The German carols were collected by Weinhold (Graz, 1853), and one of the best of the many editions of French carols (*noëls*) was published at Poitiers in 1824. During the last days preceding Christmas it is still the custom for Calabrian minstrels to descend from the mountains

to Naples and Rome, saluting the shrines of the Virgin Mother with their wild music, under the poetical notion of cheering her until the birth-time of her infant at the approaching Christmas. In a picture of the nativity by Raphael he has introduced a shepherd at the door playing on a sort of bagpipe. Preparatory to Christmas the bells are rung at dead midnight throughout England and the continent; and after the solemn celebration of the mass, for which the churches in France and Italy are magnificently adorned, it is usual for the revelers to partake of a collation (*réveillon*), that they may be better able to sustain the fatigues of the night. Among the revels of the Christmas season were the so-called feasts of fools and of asses, grotesque saturnalia, which were sometimes termed "December liberties," in which everything serious was burlesqued, inferiors personifying their superiors, great men becoming frolicsome, and all illustrating the proneness of man to occasionally reverse the order of society and ridicule its decencies.—In the Protestant districts of Germany and the north of Europe, Christmas is often called the "children's festival," and Christmas eve is devoted to giving presents, especially between parents and children, and brothers and sisters, by means of the so-called Christmas tree. A large yew bough is erected in one of the parlors, lighted with tapers, and hung with manifold gifts, sweetmeats, apples, nuts, playthings, and ornaments. Each of these is marked with the name of the person for whom it is intended, but not with the name of the donor, and when the whole family party is assembled, the presents are distributed around the room according to their labels, amid joyful acclamations and congratulations. A more sober scene succeeds, for the mother takes this occasion to say privately to the daughters, and the father to the sons, what has been observed most praiseworthy and what most faulty in their conduct. Formerly, and still in some of the smaller villages of North Germany, the presents made by all the parents were sent to some one person, who, in high buskins, a white robe, a mask, and an enormous flax wig, becoming the bugbear of children known as *Knecht Rupert*, goes from house to house, is received by the parents with great pomp and reverence, calls for the children, and bestows the intended gifts upon them according to the character which he hears from the parents after severe inquiries. A beautiful poem of Hebel, *Christ-Baum*, celebrates the German ceremonies on Christmas eve.—It is an old Swedish tradition, preserved in the history of Olaus, archbishop of Upsal, that at the festival of Christmas the men living in the cold northern parts are suddenly and strangely metamorphosed into wolves; and that a huge multitude of them meet together at an appointed place during the night, and rage so fiercely against mankind and other creatures not fierce by nature, that the inhabitants of that country suffer

more from their attacks than ever they do from natural wolves.—Christmas has always been at once a religious, domestic, and merry-making festival in England, equally for every rank and every age. The revels used to begin on Christmas eve, and continued often till Candlemas (Feb. 2), every day being a holiday till twelfth-night (Jan. 6). In the houses of the nobles a "lord of misrule" or "abbot of unreason" was appointed, whose office was "to make the rarest pastimes, to delight the beholder," and whose dominion lasted from "All-hallow eve" (Oct. 31) till Candlemas day. The larder was filled with capons, hens, turkeys, geese, ducks, beef, mutton, pork, pies, puddings, nuts, plums, sugar, and honey. The Italians have the following proverb: "He has more business than English ovens at Christmas." The tenants were entertained at the hall; and the lord of the manor and his family encouraged every art conducive to mirth.

On Christmas eve the bells were rung;
On Christmas eve the mass was sung;
That only night, in all the year,
Saw the stoled priest the chalice rear.
Then opened wide the baron's hall,
To vassal, tenant, serf, and all;
Power laid his rod of rule aside,
And ceremony doffed his pride.
The heir, with roses in his shoes,
That night might village partner choose.
All hailed, with uncontrolled delight
And general voice, the happy night
That to the cottage, as the crown,
Brought tidings of salvation down.
England was merry England when
Old Christmas brought his sports again.
'Twas Christmas broach'd the mightiest ale;
'Twas Christmas told the merriest tale;
A Christmas gambol oft would cheer
A poor man's heart through half the year.

A glowing fire, made of great logs, the principal of which was termed the yule log or Christmas block, which might be burned till Candlemas eve, kept out the severity of the weather; and the abundance was shared amid music, conjuring, riddles, hot cockles, fool-plough, snap-dragon, jokes, laughter, repartees, forfeits, and dances. The generous wassail bowls and bowls of punch never failed to bring tumultuous joys. The favorite and first dish on Christmas day was a soused boar's head, which was borne to the principal table with great state and solemnity, "upon a silver platter, with ministralsye." The common custom of decking the houses and churches at Christmas with evergreens is derived from ancient druid practices. It was an old belief that sylvan spirits might flock to the evergreens, and remain unnnipped by frost till a milder season. The holly, ivy, rosemary, bay, laurel, and mistletoe furnished the favorite trimmings, which were not removed till Candlemas. In old church calendars Christmas eve is marked, *Templa exornantur* (the temples are adorned). Holly and ivy still remain in England the most esteemed Christmas evergreens, though at the two universities the windows of the college chapels are decked with laurel. It was an old English superstition that on Christmas eve the oxen were

always found on their knees, as in an attitude of devotion, and that after the change from old to new style they continued to do this only on the eve of old Christmas day. This was derived from a prevalent mediæval notion that an ox and an ass which were present at the nativity fell upon their knees in a suppliant posture, as appears from numerous prints and from the Latin poem of Sannazaro in the 16th century. It was an ancient tradition, alluded to by Shakespeare, that midnight spirits forsake the earth and go to their own confines at the crowing of the cock. The Christmas celebrations in England have lost their primitive boisterous character, the gambols and carols are nearly gone by, and family reunions and evergreen trimmings are nearly all that remain of the various rough merriments which used to mark the festival. The last memorable appointment of a lord of misrule was in 1627, when he had come to be denominated "a grand capitaine of mischief." The poems of Herrick contain many descriptions of old English Christmas celebrations.—In the United States, since the Puritans were at first stern opponents of Christmas pastimes, the day was for a long time less generally celebrated in New England than in the middle and southern states. It has been made a legal holiday in several of the states, and is usually observed by a religious service and by making presents, and not unfrequently by trimming houses and churches with evergreens, and by imitating the German custom of Christmas trees. Santa Claus (St. Nicholas), originally introduced by the Dutch settlers of New York, is the American representative of the German Knecht Rupert.

CHRISTMAS, or **Noel-Fearn**, **Henry**, an English clergyman and author, born in London in 1811, died there, March 10, 1868. He received the degree of A. M. at St. John's college, Cambridge, in 1837, entered into orders, and filled several curacies till 1841, when he became librarian and secretary of Sion college. In 1840-'43, and 1854-'8, he was editor of the "Church of England Quarterly Review;" in 1840-'43 of the "Churchman;" in 1845-'8 of the "British Churchman;" and in 1859-'60, of the "Literary Gazette." In 1854-'9 he was professor of English history and archæology in the royal society of literature. He was also secretary of the numismatic society, and made a valuable collection of coins which were subsequently sold for a large sum. Besides editing several antiquarian works, contributing to various periodicals, and making translations from the French, German, and Portuguese, he published "Universal Mythology," "Shores and Islands of the Mediterranean," "Christian Politics," "Preachers and Preaching," "Sin, its Causes and Consequences," "Cradle of the Twin Giants," and "Echoes of the Universe." He also compiled memoirs of the czar Nicholas, and of the sultan Abdul-Medjid.

CHRISTOPHE, **Henri**, king of Hayti, born Oct. 6, 1767, died by his own hand, Oct. 8, 1820.

The accounts of his youth are conflicting; according to some he was born in the island of Grenada; others say in St. Christopher, St. Croix, or Santo Domingo. The uprising of the blacks in Santo Domingo found him a slave in that island, and he distinguished himself by activity and boldness. His bravery commended him to the notice of Toussaint l'Ouverture, who gave him a commission as brigadier general, and employed him to quell an insurrection in the northern province of the island. Successful in this, he was appointed governor of the province, and when the French under Leclerc subjugated that part of the island, he and Dessalines were declared outlaws. When Touissant was seized by the French, Christophe and Dessalines again headed an insurrection, and before the close of 1803 succeeded in driving the French from Hayti. During the brief administration of Dessalines Christophe was general-in-chief of the army, and at his death in 1806 was appointed president for life by an assembly convened at Cape Haytien. The people of the southern portion of the island, however, preferred Pétion, and soon after organized a republic of which he was appointed president. A civil war ensued between the two chiefs, which continued for 11 years. In 1811 Christophe, following the example of Napoleon, abolished the republican government, caused himself to be proclaimed king of Hayti under the title of Henri I., and organized a hereditary monarchy and nobility. He promulgated a code which, though based on the *Code Napoléon*, was not a servile copy, but was adapted to the wants of the people. Meantime the defection of some of his adherents roused the jealousy and cruelty which seemed inherent in his nature, and did much to alienate the affections of his people. In general, however, his measures were judicious, but the mild and pacific sway of Pétion, and his successor Boyer, was far more agreeable to the negroes than the stern rule of Christophe. The number and activity of the malcontents increased, till finally the army became infected, and even the king's body guard went over to Boyer. Irritated at this, and determined not to be made a prisoner, he shot himself. His eldest son, Ferdinand, had been sent as a hostage to France by Gen. Leclerc, and died there in a hospital. His second son, Jacques Victor Henri, was killed by the insurgents a few days after his father's death. A pension was conferred on the widow of Christophe, but the enmity of the people caused her to leave the island. She went to England, travelled in Germany and Italy, and finally took up her abode in Pisa with one of her daughters.

CHRISTOPHER, duke of Württemberg, a Protestant prince of the 16th century, born May 12, 1515, died Dec. 28, 1568. At the time of his birth the duchy of his father Ulric was in a very unsettled condition. In a little more than four years the confederated Swabian cities expelled Ulric from his principality, transferred

the dukedom to the house of Austria, and removed Christopher to Vienna. When Solyman besieged that city in 1529, Christopher was well nigh made a Turkish prisoner. But Charles V., fearing him more than his father, resolved to shut him up in a monastery, and for this purpose ordered him in 1532 to Spain. Christopher, finding an opportunity to escape, fled to Bavaria, where his uncle, the reigning duke, together with the landgrave of Hesse, took up his cause and that of his father; and entreaty proving unsuccessful, recourse was had to arms, which, through the secret aid of the French king Francis I., and a sudden sortie on the Austrians at Laufen, May 13, 1534, resulted in the restoration of Ulric to his duchy. Christopher succeeded to the dukedom on the death of his father in 1550, and set himself about establishing the reformed religion in his province. Instead, however, of seizing the church property, and devoting it to his own use, or dividing it among his nobles, like many Protestant princes of his day, he constituted of it a fund called the "Württemberg church property," out of the proceeds of which were supported all the public schools of the duchy, the university of Tübingen, and a variety of other public establishments. The duke also enlarged the liberties of the people and gave them a code of laws.—See Pfister's *Herzog Christoph* (Tübingen, 1819).

CHRISTOPHER, Saint, a martyr of the early church, beheaded, according to tradition, in the year 250, during the persecution of Decius. His feast is celebrated by the Greek church on May 9, and by the Latin church on July 25. The Mozarabic breviary, attributed to St. Isidore, states that a great portion of his remains were brought from the East to Toledo. Compostela, Valencia, and Astorga pride themselves on the possession of a part of his relics. The abbatial church of St. Denis, near Paris, also boasted of a like privilege. A man of gigantic stature and noble birth, he was baptized by Babylas, bishop of Antioch, and going into the desert, fixed his abode near a rapid stream, over which he was wont to carry travellers on his back. One day a little child called to him from across the swollen flood, and the hermit went fearlessly into the waters, and in the child whom he carried across discovered the Saviour. Hence his name of Christophoros, or Christ-bearer. Baronius and other historians regard him and his life as an allegory; the Bollandists and Baillet maintain the fact of his existence and his martyrdom.

CHRISTOPULOS, Athanasios, a modern Greek poet, born at Castoria in Macedonia in May, 1772, died in Wallachia, Jan. 29, 1847. His father, a Greek priest, removed from Macedonia to Bucharest in Wallachia while his son was yet a child. Athanasios was well educated at Buda in Hungary, where he learned Latin, and at Padua in Italy, where he studied medicine. On his return to Bucharest he was appointed tutor to the children of the prince

of Wallachia, Alexander Murusi, who on being transferred to Moldavia took Christopulos with him and employed him in various public offices. His first publication was a drama entitled "Achilles," which, after having been played successfully at Jassy and at Bucharest, was printed at Vienna in 1805. In the same year he published a grammar of modern Greek. Murusi being recalled to Constantinople, Christopulos accompanied him thither, and during his residence in that city wrote in modern Greek his love songs and drinking songs, on which his reputation chiefly rests. Prince Caradja, who was now appointed hospodar of both principalities, took Christopulos with him to Moldavia, where he gave him official position and charged him with the compilation of a code of laws for Wallachia, a task which occupied him two years. After the fall of Prince Caradja Christopulos resided some time at Hermannstadt in Transylvania, occupied mainly with political and philosophical writings. He went thence to Greece, and in 1836 returned to Wallachia, where he spent his remaining years in literary labor. He translated the first book of the Iliad into modern Greek, and also the first two books of Herodotus. His lyric poems were published at Vienna in 1811, and a new and enlarged edition appeared in 1821. They were published also at Paris in 1833, with a French translation, and with some of his prose writings (2 vols. 8vo). A later and fuller edition appeared at Paris in 1841. A collection of his writings was published at Athens in 1853 under the title 'Ελληνικά ἀρχαιολογήματα. His lyric poems are exceedingly popular among the Greeks.

CHRIST'S HOSPITAL, commonly called the Blue Coat school, one of the oldest and most famous of the charitable educational establishments of London. It was founded in 1552, by the citizens assembling a number of poor children for education and maintenance. Edward VI. favored the plan, and by charter, dated June 26, 1553, 10 days before his death, incorporated the three hospitals of Christ for poor fatherless children and foundlings, Bridewell, and St. Thomas the Apostle, vesting lands for their support in the mayor, commonalty, and citizens. Five years afterward Christ's hospital was opened, under the charter, in the building in Newgate street belonging to the recently suppressed brotherhood of gray friars. Four hundred children were entered. On entering they were clothed in russet, which was subsequently changed to the costume they now wear, namely, a blue tunic reaching to the feet, bright yellow petticoat and yellow stockings, red leathern girdle, clerical band around the neck, and a little round cap of black woolen. Charles II. granted £1,000 for seven years to found a mathematical school for 40 "king's boys," and an annuity of £370 10s. to send 10 others to sea; 14 additional pupils in mathematics were added on other foundations, and a writing school in 1694, by Sir John Moore,

lord mayor. The course of study was gradually augmented, until at present it embraces all the branches of a sound elementary education. The main establishment at London has four classical masters, two writing masters, two ushers, and mathematical, drawing, and singing masters, with about 800 scholars. In 1683 a branch hospital for preparatory training was established at Hertford, which now has a classical master, a writing master, two ushers, two female teachers for the girls' department, 400 boys, and 70 girls. The domestic economy of the hospital is on a plain but comfortable scale, from which, however, many of the peculiarities of old times have but recently disappeared. Formerly the scholars performed all the menial duties of the establishment, but now they are required merely to make their own beds. Until 1824 the boys breakfasted on bread and beer, and till more recently ate from wooden trenchers and drew their beer from leathern blackjacks. Every Easter they visited the exchange and the lord mayor.



Christ's Hospital.

The "king's boys" were formerly presented at court once a year; and even now from Quinquagesima Sunday to Good Friday the hospital is visited by the public to witness the "suppings in public." The government of the hospital is vested in the lord mayor and aldermen of London, and in contributors of £500. Governors exercise the right of presentation to the hospital, and have also the patronage of some ecclesiastical benefices. The hospital has long since ceased to be a "charity," properly so called, most of the pupils now admitted being children of freemen of the city of London and of clergymen of the church of England. Children whose parents have an income of £300 a year cannot be lawfully admitted. No pupil is admitted under the age of 7, nor can he remain after 15, mathematical and Greek scholars excepted. The total income is about £40,000, and the expenditures about the same. The buildings of the hospital were mostly destroyed by the great fire in 1666, but were rebuilt under the direction of Sir

Christopher Wren. They were repaired and partially rebuilt in 1825-'9. Excepting the new hall, which is one of the ornaments of the city, the buildings are irregular, although not inconvenient. Portraits of many historical personages, patrons of the institution, are preserved in its apartments. Among the eminent men educated at Christ's hospital are Bishop Stillingfleet, Camden the historian, Richardson the novelist, Coleridge, Lamb, and Leigh Hunt.

CHROMATICS, that branch of optics which treats of the mathematical relations of colors. White light may be compared to a full chord in music, containing all the notes in the octave, but the comparison must not be insisted on too closely. By refraction through a prism, the colors may be separated more or less perfectly. This separation of colors by refraction takes place in nature by means of rain drops, producing the parti-colored rainbow, or by means of minute snow crystals, producing halos. By experiment, refraction can be produced in a great variety of ways, and the different colors of white light can also be brought out by other means than refraction. The mean distance between two waves in a ray of light is .0000225 of an inch; in violet-colored rays, .0000167; and in red rays, .0000266. To chromatics also belongs the discussion of the phenomena of polarization and double refraction. These phenomena depend upon the form of the wave of light, and the direction of the motion in that wave, the wave itself always going in a straight line. It is in these most minute and subtle optical investigations that the undulatory theory of light has proved most fruitful.

CHROMIUM (Gr. *χρῶμα*, color), a metal so named from its tendency to impart beautiful colors to its compounds. About the year 1760 S. Lehmann, a Saxon mineralogist, was puzzled by a red mineral that was thought to contain gypsum, iron, and lead, and which was called red-lead spar. He wrote about it to Buffon in Latin, *De nova Mineralis Plumbi Specie Crystallina rubra*; but no one could tell him what it was. Each successive chemist who examined it detected something new, and the ore was in a fair way of contributing a complete mineralogical cabinet in itself, until Klaproth announced that it contained a new metal, and Vauquelin discovered in it a new acid. As soon as these two discoveries were announced, many of the chemists of the day attacked the mineral; and it was not long before they found that it was composed of chromate of lead. Here the history of this element would have come to an end, if some years later an iron ore had not been discovered in France which also contained it, and thus afforded it in sufficient quantity for the various uses to which it was destined to be applied. Chromium ore has since been found in many localities, among others in the United States near Baltimore, where it is a source of profit to the owners of the mines. Deville obtained chromium in the fused state by igniting a mixture of chromic

oxide and sugar charcoal in a lime crucible, intensely heated in a portable blast furnace. The metal thus prepared is shining, has a steel-gray color, a specific gravity of 6, and is hard enough to scratch glass. J. Loughlin prepares metallic chromium by exposing a mixture of chromic oxide and potassium cyanide to a white heat in a covered porcelain crucible. A solution of chromic chloride or other chromic salt, treated with sodium amalgam, yields an amalgam of chromium, which, when heated in a stream of hydrogen, leaves metallic chromium in the form of a pulverulent sponge.—Chromium forms four well marked oxides: a protoxide, CrO , and a sesquioxide, Cr_2O_3 , both capable of forming salts with acids; an intermediate oxide, CrO , Cr_2O_3 , corresponding to the magnetic oxide of iron; and a stable anhydride, CrO_3 , which by its action on bases forms salts corresponding to the manganates and ferrates. It also appears probable that a perchromic acid, HCrO_4 , exists; at least a blue liquid, which is soluble in ether, is obtained on pouring peroxide of hydrogen into a solution of chromic acid; but none of its compounds are known. The protoxide is known only in the hydrated condition, when it has a dark brown color. It forms a double sulphate with sulphate of potassium, CrSO_4 , $\text{K}_2\text{SO}_4 + 6\text{H}_2\text{O}$, corresponding to the double sulphate of iron and potassium both in form and composition. The crystals are of a fine blue color. Sesquioxide of chromium is obtained as a grayish green hydrate, by boiling with alcohol a solution of bichromate of potassium, acidulated with sulphuric acid. On the addition of ammonia, a bulky, gelatinous, bluish green precipitate of the hydrated oxide is produced. In this form it is freely soluble in acids, and forms salts, the solutions of which are green, but they do not crystallize. Sesquioxide of chromium gives rise to another set of soluble salts, which are of a violet color, and crystallize readily.—Besides the soluble variety of the salts of chromium, an anhydrous, insoluble series is known, corresponding, it would seem, to the dense and comparatively inert modification of the metal itself. Anhydrous green oxide of chromium is not decomposed by heat, and hence is used as a green color in enamel painting. For this purpose it is usually prepared by decomposing basic chromate of mercury at a red heat. Sesquioxide of chromium is the coloring ingredient in greenstone, in the emerald, in pyrope, and in several other minerals. The pink color used on earthenware is prepared by heating to redness a mixture of 30 parts of peroxide of tin, 10 of chalk, and 1 of chromate of potassium; the product is then powdered and washed with weak hydrochloric acid. A beautiful green pigment, known as *vert de Guignet*, is made by calcining bichromate of potassium with three times its weight of crystallized boracic acid.—Chrome ironstone, FeO , Cr_2O_3 , is the principal ore of chromium. It corresponds in composition to the brown oxide of chromium,

and to the magnetic oxide of iron; part of the iron is, however, generally displaced by the isomorphous metal magnesium, and part of the chromium by aluminum. Of the pure ore, 100 parts contain 48.27 per cent. of chromium, and yield 39.6 of chromic acid.—Chromic anhydride, or chromic acid, CrO_3 , is obtained by mixing four measures of a cold saturated solution of bichromate of potassium with five of oil of vitriol; as the liquid cools the chromic anhydride separates in beautiful crimson needles. The crystals are allowed to dry on a porous tile under a bell glass. It fuses at 400° , and at a higher heat is converted into the sesquioxide. The anhydride is deliquescent, has a sour metallic taste, and possesses considerable oxidizing power.—*Chromates*. Chromic acid forms three classes of salts: basic, normal, and acid. Bichromate of potash, or anhydro-chromate of potassium, $\text{K}_2\text{Cr}_2\text{O}_7 = \text{K}_2\text{O}$, 2CrO_3 , is prepared by heating chrome ironstone to redness and quenching in cold water; it is then reduced to an extremely fine powder, and heated to bright redness in a current of air, in a reverberatory furnace, with a mixture of chalk and carbonate of potassium, the mixture being constantly stirred to hasten the oxidation. When this is complete, the product is digested in water, carbonate of potassium being added if necessary to decompose any chromate of calcium which may have been formed, and the yellow solution is drawn off from the insoluble matter; it is then supersaturated with nitric acid; a portion of silica is thus precipitated, and after this has been separated, the liquid on evaporation yields crystals of the bichromate of potash. Neutral chromate of potash, K_2CrO_4 , is prepared by adding a solution of carbonate of potassium to the bichromate, until it becomes of a light yellow color. A tetrachromate of potassium, K_2O , 3CrO_3 , has also been obtained by Mitscherlich. Chromate of lead, PbCrO_4 , forms a pigment called chrome yellow. It is obtained by precipitating a somewhat dilute solution of acetate of lead by one of chromate or bichromate of potash. It is insoluble in water or acids. At 400° to 500° its color becomes reddish brown; at a higher temperature it fuses. The fused chromate is sometimes used instead of oxide of copper in organic analysis. Dibasic chromate of lead, of a splendid scarlet color, may be obtained by boiling a solution of the yellow chromate of lead with half an equivalent of lime; or by adding to a solution of nitrate of lead a solution of chromate of potassium, with which an additional equivalent of hydrate of potash has been previously mixed. A still more brilliant color may be obtained by fusing 1 part of normal chromate of lead with 5 parts of nitre. This salt is used to impart a permanent orange to calico.—*Sulphates of chromium*, Cr_2SO_4 . There are three varieties of this salt, the first green, the second violet, and the third red. The violet modification forms with sulphate of potassium, and with sulphate of ammonium, a beautiful violet double salt

(chrome alum), which crystallizes by spontaneous evaporation in bold octahedra, and corresponds in form and composition to ordinary alum.—The following are the most important applications of chromium compounds in the arts. The yellow or neutral chromate of potash is the basis of all other preparations, being made directly from the chrome ironstone. The red or bichromate of potash is obtained from the foregoing salt, and is extensively employed in the arts. In photography it is the basis of most of the printing processes, on account of its property of rendering gelatine insoluble by exposure to light. In dyeing, it is extensively used as a mordant. It is the material from which the chromic oxide, chromic acid, and the metallic chromates are prepared. Chromic oxide is the most insoluble green pigment known; it is extensively used in printing bank notes and in staining glass and painting porcelain. Chromic acid is a powerful oxidizing agent, and is used on this account in chemical researches; is found very valuable as an exciting fluid in galvanic batteries; was used for preparing the beautiful mauve red from aniline; is employed in bleaching palm oil, and in destroying the empyreumatic impurities of acetic acid, &c. The chromates of lead, bismuth, baryta, strontia, and zinc are employed as pigments, varying in tint from the vermilion red of the basic chromate of lead to the pale straw yellow of the strontia salt. The common chrome green is a mixture of chromate of lead and Prussian blue. The beautiful violet chromic chloride has been proposed as a remedy for cancer. Chromium steel, made by combining about 5 per cent. of chromium with cast iron, possesses most remarkable properties. On account of its excessive hardness, it is the best metal for the construction of safes, while its tensile strength, equal to a strain of 140,000 lbs. to the square inch, especially adapts it to the construction of suspension bridges.

CHRONICLES, the name first given by Jerome to two books of the Old Testament, which in the English Bible are the last of the historical books, while in the Hebrew Scripture they conclude the entire volume. By the Alexandrine translators they were termed *Paraleipomena*, or things omitted, being regarded as supplementary to the previous histories. In the original Hebrew they are entitled "Words of the Days" (*Dibre hayamim*), and form, as their internal character demonstrates, but one book. The Chronicles open with genealogical registers of ancient and renowned families or races; they then narrate the history of David, harmonizing with the earlier account in the book of Samuel; then follows a history of Solomon, and of the increasing prosperity and glory of the Jews under him; after the division of the kingdom at his death, they trace the history of Judah, the more powerful branch, and continue the narrative till after the fall of Israel, and to the end of the exile in Babylon. They thus had a com-

paratively late origin, which is indicated also by the style and idiom, and by the Levitical coloring which overspreads much of the narrative. The Jewish and Christian traditions, from the earliest times down to the 17th century, have referred the Chronicles to the age and to the pen of Ezra. Spinoza assigned their origin to the time of the Maccabees, and his opinion has been accepted by several later scholars. Bertheau, one of the ablest writers on this book, believes it was written about 300 B. C. The earlier Jewish records furnished the materials of the history in the Chronicles, and numerous books are mentioned as sources and authorities which are not extant, or have not been admitted into the canon. The chief source appears to have been a "Book of the Kings of Judah and Israel," which however cannot have been our canonical book of Kings. The design of the book seems to have been, by a review of the history of the theocracy, to prove that Levitical worship had been maintained and favored by all pious kings, and that adherence to it or departure from it had been the condition of fortune or misfortune to the Jewish people. The discrepancies between the books of Chronicles and of Kings have occasioned an important discussion on the trustworthiness of the history of the former. Prominent among those who have denied to the accounts peculiar to the book of Chronicles any claim to credibility are De Wette, *Beiträge zur Einleitung ins Alte Testament* (1806), and Gramberg, *Die Chronik nach ihren geschichtlichen Character und ihrer Glaubwürdigkeit neu geprüft* (1823). Among the most successful writers in vindication of the Chronicles are Movers (*Kritische Untersuchungen über die Biblische Chronik*, Berlin, 1833) and Keil (*Apologetischer Versuch über die Chronik* (Berlin, 1833). Of more recent commentaries, the most valuable is that of Bertheau, *Die Bücher der Chronik erklärt* (Leipsic, 1854; 2d ed., 1860; English, Edinburgh, 1857). See also the introductions to the Old Testament by Hävernick, Davidson, and Bleek, and Ewald's *Geschichte des Volkes Israel*.

CHRONOLOGY (Gr. *χρονολογία*, from *χρόνος*, time, and *λόγος*, discourse), the science of establishing historical dates, by arranging events in the order of their succession, and determining the interval between each and some fixed period in time. We are so accustomed to the facility with which this is accomplished by means of the Gregorian calendar and the conventional fixed point of the Christian era, that we can hardly appreciate the obstacles which have been overcome in order to bring the science to its present state. It was necessary at the outset to find some tangible standard by which to measure the intangible element of time. The most obvious measure is the day, or regular interval between one apparent rising or setting of the sun and another. This, though exact as far as we can know, is so short as to be inconvenient when applied to

long periods. The next longer obvious measure is the interval between one new moon and another. It was found that this was about 29½ days; and the month became the usual standard for measuring considerable spaces of time. But a larger definite measure was desirable for still longer periods. The round of the seasons appeared to furnish this; but, ignorant of the cause, men had no means of ascertaining the precise length of the year, or indeed if it had any certain length. Twelve months was an approximation to the average interval from harvest to harvest, and the year was at first made to consist of 12 months, alternately of 29 and 30 days, or 354 days. This being found too short, the year was lengthened to 360, and then to 365 days, various expedients being adopted to make the lunar and solar years correspond, by intercalating the requisite number of days. In time it was found that a fractional part of a day was required to make up a complete year. By observing the interval between the periods when Sirius, the dog star, rose with the sun, the value of this fraction was found to be very nearly one fourth of a day. The year of 365¼ days was called the Sothic year, from the Egyptian name for Sirius, and sometimes the square or perfect year. It differs by less than 12 minutes from the true year as settled by the most accurate observations. Though known to astronomers long before, it appears not to have been used for chronological dates until the time of Julius Cæsar. The old years of 354, 360, and 365 days were still employed for various purposes, and the commencement of the year was made to fall at different seasons. Hence has arisen much of the confusion which exists in the calendars of different times and nations. (See CALENDAR, DAY, and YEAR.)—For a long period there was no fixed point of time from which dates were reckoned. Individuals would naturally count from the year of their birth; monarchs from that of their accession, which is the notation of most ancient inscriptions. In course of time different peoples began to date from some event of national importance. The earliest of these fixed epochs is that of the Romans, who some centuries after that event began to date from the foundation of Rome. There was some question as to the exact time of this, some placing it in the year answering to our 753 B. C., others in 751, 750, or 747. In Greece, the Olympic games became the event of paramount national interest. These games were celebrated every fourth year. But in retracing the succession of these Olympiads, when, perhaps in the 3d century B. C., it was deemed advisable to adopt them as an era, the victory of Coræbus was found to be the earliest recorded. Consequently the period of the games in which he was victorious was called the first Olympiad, and they were calculated to have taken place about 108 years after the restoration of the games by Iphitus, or about 776 B. C. An event occurring 775 years after

the commencement of this era was set down as happening in the 3d year of the 193d Olympiad. Moreover, the original Grecian year consisted of 12 months of 29 and 30 days alternately; and in order to make the lunar year accord with the solar, an intercalary month of 30 days was added, at first every second year, and subsequently three times in eight years. This period of eight years, styled the *octaeteris*, contained 99 months, or 2,922 days, exactly equal to 8 years of 365½ days, the Olympiads consisting alternately of 49 and 50 months. The three years (the 3d, 5th, and 8th) which had the intercalary month were styled embolismic years, and had 384 days, while the other five years had 354 each. But as a lunar month is somewhat more than 29½ days, the *octaeteris* fell a little short of 99 months; and to make up for this, three days were added to each alternate Olympiad; but this made the solar year by so much too long. The error was allowed to go on for 40 Olympiads, by which time it had accumulated to 30 days, when a month was dropped, and the solar and lunar years again corresponded. Thus in a period of 40 Olympiads there were four kinds of years: the common, of 354 days; the embolismic, of 384; the last of each alternate *octaeteris*, 387; and the last year of the 40th Olympiad, of 357 days. In the last year of the 86th Olympiad was introduced the Metonic cycle of 19 years, perhaps the greatest achievement of ancient astronomy, at the end of which each new moon comes back to the same day of the year. This continued in use as long as time was reckoned by Olympiads, and is still used in determining the days upon which the movable feasts of the church will fall. The Babylonian era of Nabonassar, beginning at noon, Feb. 26, 747 B. C., has a special scientific interest from the fact that its commencement is astronomically determined to a minute. The year consisted of 12 months of 30 days each, to which 5 days were added at the end, so that 1,460 Julian years are equal to 1,461 Babylonian. The Mohammedans, the Persians excepted, reckon from the *hegira*, or flight of Mohammed from Mecca to Medina, July 16, A. D. 622. The Mohammedan year is strictly lunar, the civil months being adapted to the lunations by means of a cycle of 30 years, 19 of which have 354 days, and 11 have 355. Hence 30 Mohammedan years are equal to only 29 Julian years and 89 days. To convert a date of the *hegira* into the corresponding one of our notation, it is not sufficient to add 622, as is sometimes carelessly done. Thus the treaty between the emperor Charles VI. and the sultan is dated 1153 of the *hegira*; instead of 1775 of our era, it is 1740. The difference increases nearly one year in 30. Since about 1530 the Mohammedans in India have dated from the *hegira*, but they use the solar year; hence their dates are now about nine years behind the Arabic and Turkish. The Persians do not date from the *hegira*, but from A. D. 632, the year of the accession of the

shah Yezdegird; their year consists of 365 days, and they have a complicated but very accurate system of intercalation. This era is also used by the Parsees of India. The Armenians date from July 9, 552, the year of the council of Tiben, which, by condemning the decrees of the council of Chalcedon, formally separated the Armenian from the Greek church. The Hindoos use both the sidereal and the solar year, and employ the eras of Kaliyug, 3101 B. C., the Vicramaditya, 56 B. C., the Salivahana, A. D. 78, and the Fuslee, about A. D. 590. The Chinese have a complicated calendar. For chronological purposes they employ a series of yearly, monthly, and daily cycles of 60. Each year, month, and day has its own name in its cycle. By compounding these names, a single word expresses the year, month, and day. The year 1864 was the first of a cycle, so that 1873 is its 10th year. The character denoting a cycle first appears at 2357 B. C., and this is noted as the 41st year of the cycle, so that the epoch of this cycle would be 2397 B. C., which is accepted by the authors of the *Art de vérifier les dates*; but the Chinese mathematical tribunal has from time immemorial begun this cycle with 2277 B. C., apparently assuming that there had been a dating back in the records. For more than 20 centuries Chinese historians have dated from the year of the accession of the reigning emperor. A particular name, not necessarily that of the sovereign, is given by authority to each reign, and the years are numbered 1, 2, 3, and so on; a register of these eras is kept, by aid of which the chronological year may be ascertained; just as to determine the date of an English statute, we must know the year in which the sovereign under whom it was enacted began to reign. The Jews, whose calendar is that of the ancient Greeks in its perfected form, date from the creation, which according to their usual computation took place in 3760 B. C. The Russians date ecclesiastically from the creation, which, according to their computation of the dates in the Septuagint, took place 5508 B. C. Historically they use the common Christian era, but adhere to the old style of 365 $\frac{1}{4}$ days to the year, which is nearly 12 minutes too long, the difference amounting to not quite a day in a century. In 1700 the variation was 11 days, in 1800 it became 12, and will so continue till 1900, when it will be 13, and will remain so until 2100, when it will be 14, should the Russians then adhere to the old style.—When Christianity became predominant in the civilized world, writers began to date from various epochs in the history of the Saviour. About the middle of the 6th century Dionysius Exiguus, a Roman abbot of Scythian birth, introduced the method of dating from the birth of Christ, which according to his computation took place in the 4th year of the 194th Olympiad, the 753d from the foundation of Rome. It is generally conceded that he placed this event about four years too late; this is however of no im-

portance in chronology, as it merely involves the necessity of placing the date of the birth in the year 4 B. C. Dionysius began his year with the Annunciation, the 25th of March, nine months before the day which is now considered to be that of the birth of Christ; so that his era, which continued in use for some centuries, is by so much in advance of that now in use. Christmas and Easter were also sometimes taken as the commencement of the year. These differences occasion some apparent discrepancies in dates during the middle ages. Thus, Charlemagne was crowned on Christmas day, 800, and died Jan. 28, 814, reckoning the year to begin on the 1st of January. But the chronicle of Metz says that he was crowned on Christmas day, 801, and the chronicle of Moissac that he died in January, 813. Although there is an apparent variation of two years, the same day is meant in every case. The Metz chronicle begins the year with Christmas day, so that the remaining days of December belong to 801; the Moissac chronicle begins the year with the annunciation, and the days from Jan. 1 to March 25 belong to 813. Had the coronation taken place a week and the death two months later, the dates by all these modes of reckoning would have been the same. So, too, in all dates previous to 1582, it must be noted whether they are given in the old style or have been reduced to the new, as is usually done in modern chronology.—Could the precise time of the creation be ascertained, it would be the natural starting point from which to date. But the history of ancient nations, unless we make an exception in the case of the Hebrews, goes back into mythical periods of thousands or millions of years; and even after the records begin to assume a historical aspect, the discrepancies are very great. The Hindoo chronology, as computed by Gentil, reaches to 6,174 years before the Christian era; the Babylonian to 6,158, and the Chinese to 6,157, according to Bailly. About 200 different computations have been made, based upon the Hebrew, Septuagint, and Samaritan texts of the Bible. The longest is one by Regiomontanus, 6,984 years; next that of Clement of Alexandria, 5,624; the most accredited one based on the Septuagint is 5,508; that by Usher, from the Hebrew, is 4,004, which the Jews reduce still further, the lowest, by Rabbi Lipmann, being only 3,616 years. The main cause of these discrepancies is the different numbers given in the Septuagint and the Hebrew texts. There is a Samaritan text of the Pentateuch which differs from both; but this is now admitted to be of no authority. Josephus also gives dates, but he is altogether too careless to be taken into account. The main variations between the Septuagint and the Hebrew are found in the two periods from Adam to the flood, and from the flood to the call of Abraham. For the former period both give the same list of 10 generations in direct succession, with the entire life of each patriarch, in which they agree; and his age at the

birth of the son by whom the succession was carried on, which gives the total length of the period, wherein they differ widely. The two statements stand thus:

PATRIARCHS.	BEFORE BIRTH OF HEIR.		Total Age in both.
	Hebrew.	Septuagint.	
Adam.....	130	230	930
Seth.....	105	205	912
Enos.....	90	190	905
Cainan.....	70	170	910
Mahaleel.....	65	165	895
Jared.....	162	162	962
Enoch.....	65	165	865
Methuselah.....	187	187	969
Lamech.....	182	183	777*
Noah (at flood).....	600	600	
Time of the flood.....	1,656	2,262	

There are various means of explaining this difference of 606 years. Modern scholars give the preference to the following of Böckh. The 2,262 years of the Septuagint are considered an attempt on the part of the 70 interpreters at reducing the 1,656 years of the Hebrew text to 19 Sothic cycles, which are equal to 27,759 Egyptian years, or to as many months of $29\frac{1}{2}$ days, in all 818,890 $\frac{1}{2}$ days, and which are equal to 2,242 Julian or Sothic years. This Sothic year, which differs from the Julian in the day of commencement alone, seems to have been the year of the priests, and its early use by the Egyptians is shown on a calendar sculptured on the exterior of the temple of Medinet Abu at Thebes. But supposing the Hebrew figures proved genuine, there remains the difficulty of proving them historical. They place the time of the flood at about 2340 B. C. Both the Babylonian and Egyptian histories represent powerful monarchies as existing about or before that date. Sir Gardner Wilkinson places the beginning of the 4th Egyptian dynasty at 2450, and this was preceded by several others. Rawlinson places the foundation of the Chaldean monarchy at about 2286. Others carry these dates still further back. This difficulty may indeed be got over by assuming the Egyptian and Babylonian chronologies to be erroneous. But the Hebrew dates seem to be inconsistent with historical events narrated in connection with them. According to the present text, Abraham was born not quite 300 years after the flood, when the whole human family consisted of but eight individuals. Yet it is clear from the narrative that in his day the whole region from the Euphrates to the Nile was densely peopled. There were also powerful kingdoms east of the Euphrates; for we find Chedor-laomer, king of Elam, that is, of southern Persia, with three allies, making military expeditions to the valley of the Jordan. Now a period of about 376 years from the flood to the migration of Abraham to Canaan is altogether too short to allow such an increase of the human race, ac-

cording to any known law of the growth of population. If we assume the Septuagint period of 1,147 years, this difficulty is obviated, and the chronology approximates to that of the Egyptians, Babylonians, and Chinese. It is safer, upon the whole, to consider the entire chronology of the world to be uncertain up to about the time of Abraham. From that time the chronologist begins to tread upon firm ground, the Hebrew dates being clear and definite within a few years. The exodus from Egypt is well fixed at 440 years after the migration of Abraham. From the exodus to the completion of Solomon's temple the Hebrew text gives 480 years, the Septuagint 440. An attempt has indeed been made to extend this period by about 150 years; but it seems to be based upon insufficient data. From the time of Solomon Hebrew chronology becomes fairly connected with that of Egypt, Assyria, and Babylonia, and the dates of each are confirmed by the others. Chinese and Hindoo chronology is fairly credible to about 2200 B. C. Greek and Roman dates are generally well authenticated to the 1st Olympiad and the establishment of the consulate, previous to which they are mainly traditional or legendary. From the Christian era to our own times the date of nearly every important event is settled beyond question within a year or two.—The materials for the chronologist consist of original monuments, such as inscriptions, coins, and the papyri found on Egyptian mummies, and of written records either contemporaneous with the events or handed down through a succession of writers. Inscriptions and coins have a special value, as they are usually made by public authority, and in any case exist in their original state; whereas in successive transcriptions or quotations there is always a possibility of error. The Assyrian, Babylonian, and Egyptian inscriptions are in extinct languages and in characters long obsolete. For the means by which these have been deciphered, see CUNEIFORM INSCRIPTIONS, and HIEROGLYPHICS. The written records of Egypt, besides the papyri, come through Manetho, who lived about 300 B. C., and professes to have made use of original authorities. Of his work we have only fragments preserved in citations by later Greek writers. The written history of Babylonia, besides the inscriptions and tablets, comes mainly through Berosus, who wrote about 260 B. C.; of his work also only fragments are extant. Ctesias, a Greek, about 415 B. C., wrote a history of Babylonia, but it is not regarded as authentic. Herodotus is valuable only as to events of his own time, about 450 B. C., and those of a century or two earlier.—Attempts have been made to bring astronomy to the aid of chronology. Eclipses being anciently regarded as portents, occasional mention is made of them in connection with historical events. Thus Herodotus says that a battle between the Medes and Lydians was brought to a close by a total eclipse of the sun, assumed to be that of 610 B. C. Now if it

* So in the Hebrew; in the Septuagint, 753.

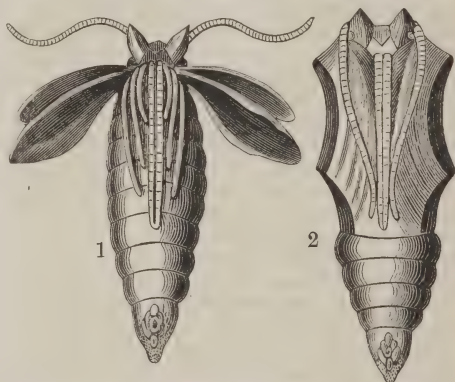
could be ascertained by astronomical calculation that an eclipse was visible about that time in Asia Minor, its exact period would fix the date of the battle. But the calculation of a solar eclipse at such a remote time is a somewhat uncertain operation; for the minutest error in the tables used would throw the moon's shadow on an entirely different part of the globe. Mr. Airy, the British astronomer royal, has calculated that the eclipse of 610 could not have been visible in any part of Asia Minor, and that the only one applicable to the case is that of May 28, 585. If therefore the statement of the historian as to the fact, and the calculation of the astronomer as to the eclipse, are correct, the battle occurred in 585 and not in 610. Either may be erroneous, most likely Herodotus. Lunar eclipses, being visible over a whole hemisphere, require much less nicety of calculation, and are more available for chronological purposes.—The foundation of the modern science of chronology may be said to have been laid by Joseph Scaliger in his works *De Emendatione Temporum* (Paris, 1583; enlarged, Leyden, 1598; Geneva, 1629), and *Thesaurus Temporum* (Paris, 1606; best ed., Amsterdam, 1658). Among other important works are: Petavius, *De Doctrina Temporum* (Paris, 1627), with its continuation, *Uranologion* (Paris, 1630), and abridgment, *Rationarium Temporum* (Paris, 1630, and since); Riccioli, *Chronologia Reformata* (Bologna, 1669); *L'Art de vérifier les dates*, by the Benedictines of St. Maur (last ed., 1783-'77), continued by Fortia d'Urban; Champollion-Figeac, *Résumé complet de chronologie générale et spéciale* (Paris, 1830); Ch. Dreyss, *Chronologie universelle* (1853); Kornick, *System der Zeitrechnung in chronologischen Tabellen* (Berlin, 1825); Ideler, *Handbuch der mathematischen und technischen Chronologie* (Berlin, 1825), and *Lehrbuch der Chronologie* (Berlin, 1831); Matzka, *Chronologie in ihrem ganzen Umfang* (Vienna, 1844); Lepsius, *Chronologie der Aegypter* (Berlin, 1849); Archbishop Usher, *Annales Veteris et Novi Testamenti* (London, 1650-'54); Sir Isaac Newton, "Chronology of Ancient Kingdoms" (London, 1728; an answer to it was written by Fréret, Paris, 1758); Jackson, "Chronological Antiquities" (London, 1752); Blair, "Chronology and History of the World" (London, 1756; a new edition, revised and enlarged by J. W. Rosse, was published in London, 1856); Playfair, "System of Chronology" (Edinburgh, 1784); Hales, "New Analysis of Chronology" (1800-'12); Clinton, *Fasti Hellenici* (Oxford, 1824-'34), and *Fasti Romani* (Oxford, 1845-'50); Sir Harris Nicolas, "The Chronology of History" (in Lardner's "Cabinet Cyclopædia," vol. xlv., 1833). Rawlinson's translation of Herodotus (4 vols., London, 1858-'60; new ed., London, 1862, New York, 1872) is furnished with valuable dissertations in respect to ancient chronology by Sir Henry Rawlinson and Sir Gardner Wilkinson; and

his "Five Great Monarchies" (2d ed., London, 1870; New York, 1871) treats elaborately of the chronology of Chaldea, Assyria, Babylon, Media, and Persia. Among the most useful manuals of reference are: J. W. Rosse, "Index of Dates" (London, 1858), which forms an alphabetical index to Blair's "Chronological Tables;" Haydn's "Dictionary of Dates," continued by Vincent (12th ed., London and New York, 1866, with supplement to 1870); Woodward and Cates's "Encyclopædia of Chronology" (London, 1872).

CHRONOMETER. See CLOCKS AND WATCHES.

CHRUUDIM, a town of Bohemia, formerly capital of a circle of the same name, situated on the right bank of the Chrudimka, 60 m. E. S. E. of Prague; pop. in 1869, 11,218. It has a *Realschule*, a high school, several breweries, sugar factories, and paper mills.

CHRYsalis, a name generally limited to the second stage of the growth of lepidopterous insects, or to the pupa from a caterpillar, be-



Chrysalis of large Tortoise-shell Butterfly, magnified. 1. With the upper parts opened. 2. With the upper parts pressed down and adhering to the body.

cause, as the term implies, they are sometimes gilt or ornamented with golden spots; aurelia is synonymous with chrysalis. When the limbs are not covered, the term nymph is applied to insects in this stage, more especially when the grubs eat; and the word pupa is properly employed for those which entirely lose the larva form, take no food, and remain motionless, bound up like a swathed mummy. The chrysalis, like all pupæ which undergo a complete metamorphosis, is motionless and does not eat. On a close examination, traces of the head and its organs, the wings, and the legs, may be seen closely pressed to the body and adherent to it by a kind of varnish. Some are angular and covered with protuberances, but most are smooth and spindle-shaped. The manner in which the perfect insects come out has been described in the article BUTTERFLY, where also are mentioned their various modes of suspension. Most are contained in a cocoon, from which exit is easy for the insect by the disposition of the threads at one end. Those of the butterflies are uncovered and

fixed by the posterior portion, and usually open in a few days, while in others the chrysalis state lasts through the winter, either in the open air, underground, in holes in walls and trees, or in silken cocoons. Some of the social caterpillars remain in company in the chrysalis state, each constructing a cocoon at the end of their last nest. The most useful of these cocoons is that of the silkworm; but other caterpillars form coverings more remarkable in shape and presupposing greater intelligence in the makers. As in the previous stages of the metamorphosis, the chrysalis opens on the back to give exit to the perfect insect.

CHRYSEÏS, daughter of Chryses, a Trojan priest of Apollo, mentioned in the Iliad. When Lyrnessus was taken by the Greeks, in the distribution of the spoils she fell to Agamemnon. On his refusal to give her up to her father, who offered a rich ransom, Apollo sent his arrows into the Grecian camp in answer to the prayers of his priest, spreading a pestilence among the soldiers. Agamemnon was then forced to surrender his captive, but to fill her place seized upon Briseis, who had fallen to Achilles. Hence arose the quarrel between these two warriors which prolonged the Trojan war, and with which the story of the Iliad opens.

CHRYSIPPUS, a Greek philosopher of the Stoic school, born at Soli, in Cilicia, in 280 B. C., died in 207. It appears that he went to Athens after having lost a large fortune, and became a pupil of the Stoic Cleanthes, perhaps of Zeno himself, but at the same time diligently studied the arguments of the Sceptics against the Stoic doctrines. His acuteness in argument obtained for him the designation of "the sword for the knots of academicians." In his philosophical system he followed closely in the steps of his master, whose doctrines he seems to have made popular. It is stated that he was the author of 700 works. Only a few fragments of them have been preserved. The most elaborate essays upon Chrysippus and his philosophy are those of Baguet, *De Chrysippi Vita, Doctrina, et Reliquiis* (Louvain, 1822), and F. C. Petersen, *Philosophia Chrysippi Fundamenta* (Hamburg and Altona, 1827).

CHRYSOBERYL (Gr. χρυσός, gold, and βήρυλλος, beryl), a gem, also called cymophane (κύμα, wave, and φαίνω, to appear), so named from a peculiar opalescence it sometimes exhibits. It occurs in crystals derived from the rectangular prism. It is of vitreous lustre, specific gravity 3.5 to 3.8, and hardness 8.5. The crystals are transparent or translucent, and of light shades of green, colored by oxide of iron and sometimes probably by chrome. The finest transparent crystals are cut with facets, and are then known and highly prized by the name of oriental chrysolite or oriental topaz. If opalescent, they are usually cut *en cabochon*, and unless very brilliant are of little value. The mineral consists of nearly 80 per cent. of

alumina and 20 of glucina; a small proportion of oxide of iron is usually present. It is found in Brazil and Ceylon, in rolled pebbles among alluvial deposits; in the Ural, associated with beryl in mica slate; in Haddam, Conn., in granite, with garnet, beryl, &c. It also occurs in Vermont, and near Saratoga, N. Y.

CHRYSLITE (Gr. χρυσός, gold, and λίθος, stone; so named from its color), a common constituent of some eruptive rocks, and also occurring in or among metamorphic rocks, with talcose schist, hypersthene rocks, and serpentine; or as a rock formation; also a constituent of many meteorites. The eruptive rocks, basalt and basaltic lava, consist of chrysolite (the variety olivine), along with labradorite or other feldspar, and augite. It is essentially a silicate of magnesia, with from 6 to 8 per cent. of protoxide of iron.

CHRYSOLORAS, Manuel, a learned Greek of Constantinople, the first who revived the study of Greek literature in Italy toward the close of the middle ages, born about the middle of the 14th century, died at Constance, April 15, 1415. The eastern empire being in danger of overthrow by Bajazet II., Chrysoloras was sent by the emperor about 1390 as ambassador to the western powers to solicit aid against the Turks. He visited Italy, France, and England; but his mission having failed, he was induced about 1395 to become a public teacher of Greek at Florence. He passed thence to various Italian universities, and was the preceptor of several early Hellenists; among others, of Leonardo Bruni, Poggio, and Guarino of Verona. His *Erotemata*, an introduction to Greek grammar, was the first and long the only channel to a knowledge of that language, save oral instruction; and it was several times reprinted after the grammars of Gaza and Lascaris had come more into use. He wrote many religious works, and letters on various subjects, most of which exist only in manuscript. He enjoyed a high reputation for eloquence and theological learning, was employed by Gregory XII. in negotiations for the reunion of the Greek and Latin churches, and accompanied Pope John XXIII. to the council of Constance, where he died.—His nephew, JOHN CHYSOLORAS (died 1462), followed him to Italy, and has sometimes been confounded with him.

CHRYSOSTOM, John, a bishop, doctor, and saint of the eastern church, born in Antioch, according to the best authorities, Jan. 14, 347, died Sept. 14, 407. His name was only John, the appellation Chrysostom (Gr. Χρυσόστομος, the golden-mouthed), by which he is usually known, not having been given to him until the 7th century. His father, Secundus, who was *magister militum Orientis*, died while John was still in his infancy. Arethusa, his mother, left a widow in her 20th year, resolved to remain single in order to devote her whole life to her boy. Intending him to follow the legal profession, she sought for him the best school of eloquence, and placed him with the re-

nowned Libanius, then teaching at Antioch. Libanius, who had formerly had among his pupils the great Basil of Cæsarea, his brother Gregory of Nyssa, and his bosom friend Gregory Nazianzen, had also been the master of the emperor Julian, and his most ardent auxiliary in his endeavor to put down Christianity and restore the worship of the old gods. He welcomed John, soon discovered his genius, labored to develop it, and predicted the preëminence which his favorite pupil afterward attained. At the age of 18 he was practising at the bar, where even then more than one great success laid the foundation of his fame. This, as well as his social position and the virtues of his mother, drew on him the eyes of Meletius, bishop of Antioch, who wished to secure as a member of his clergy one so full of promise. He instructed and baptized him, gave him his first lessons in ecclesiastical science, ordained him lector or reader, and assigned him a residence beneath his own roof. This was not what his mother had designed for him; she had set her heart on seeing him foremost in the race for worldly honors, and resisted with all her might his entrance on a career so different. She represented to him that for love of him she had in youth renounced all earthly joys, and that he must not think of forsaking her now when old age and its infirmities were fast approaching. It was all in vain. The same wave of ascetic fervor which was carrying away into solitude and the austerities of monastic life the very élite of Christian youth, bore John into the mountains which surrounded his native city. For six years, two of which were spent in a hermitage, he gave himself up to a life divided between the study of the Scriptures and prayer, mortifying his body meanwhile with such rigor that his limbs were nearly paralyzed. The urgent solicitations of his friends at length drew him back to Antioch, where the pallor of his countenance and his extreme emaciation touched all beholders with pity or veneration. Several years passed before he was ordained deacon. In 381 Meletius died. A rival Christian faction, with Paulinus as its bishop, had divided the church at Antioch. John, while yet a deacon, strove in vain to heal the schism. Flavian, successor to Meletius, appreciated his learning, eloquence, and disinterestedness. So great, indeed, was the esteem in which he was held throughout Asia Minor, that even before his elevation to the priesthood the neighboring bishops sought to raise him to the episcopal office. He shrank from the honor and responsibility, but induced his friend Basil to accept the proffered rank. In 386 John became a priest, and commenced his course as a preacher. He was justly considered even then as the shining light of the eastern church. In 397 the see of Constantinople became vacant by the death of Nectarius. For three months rival candidates and contending factions sought to no purpose to fill the coveted see. The

eunuch Eutropius, then all-powerful at court, and who had heard John's preaching, submitted his name to the emperor Arcadius. The latter approved of the choice; and forthwith a messenger was sent to Asterius, prefect of the East, who resided at Antioch, bidding him to secure by some stratagem the person of the presbyter John, and send him to Constantinople. John was invited by Asterius to accompany him on a visit to a new church just erected outside of Antioch, and his chariot was driven amid an armed escort toward the Bosphorus. After the first emotion of surprise and anger, John thought he saw in all this the hand of an overruling Providence, and submitted passively. The episcopal chair of Constantinople, in which John now found himself, had a few years before been adorned by Gregory Nazianzen. Nectarius, whom Theodosius chose as his successor, had not even been baptized when, to his dismay, he, in the midst of the second general council, saw himself raised to such an exalted rank. But he discharged his episcopal functions with a careful piety, charming Theodosius and his court by his majestic presence and graceful manners, and dispensing in the patriarchal residence a princely hospitality to the many churchmen whom business drew to the capital. Chrysostom brought a new spirit to these halls. He resolved to make his household a model for every household of churchman and layman within his jurisdiction, and his own life a mirror in which every bishop and priest should see what they must be themselves in order to be true shepherds in Christ's flock. He made a monastic frugality preside over his table and all his domestic expenses. The rich furniture of his predecessors and their abundant wardrobe of silks and cloth of gold were sold at auction, and the proceeds given to the poor. Nectarius had purposed erecting a magnificent basilica, and collected a large quantity of precious marbles and other rare building material. John did not hesitate to sell them for the benefit of the needy classes. The very sacred vessels which he judged too costly for the altar were similarly disposed of. This displeased the clergy, while the people were taught to attribute these reforms to parsimony or avarice. But when the poorly clad archbishop appeared in the pulpit of St. Sophia, his hearers forgot everything but that they possessed a man of God in their midst. It is impossible to study his works without being impressed with his deep devotion to the people. Hence, in Constantinople as at Antioch, whenever he preached the largest edifices could not contain the crowds who flocked to hear him. They surrounded him in the streets, pouring blessings on his head as he passed along; and when his liberty or his life was threatened at a later period, they watched night and day around his dwelling. "I love you," he one day exclaimed to the worshipping throng—"I love you as you love me. What should I be without you? You are to me fa-

ther, mother, brothers, and children; you are all the world to me. I know no joy, no sorrow, which is not yours." This popularity constituted one great source of his power, and he used it in his vain attempt at reform both in court and church. Eutropius, who had been mainly instrumental in his elevation, did not find favor with the archbishop, who denounced his tyranny and the corruption which he encouraged in every branch of the administration. He retaliated by having a law passed which repealed or abridged ecclesiastical immunities, and in particular limited the right of asylum granted to churches. John inveighed against the extravagance and licentiousness of the court. Arcadius dreaded the remonstrances which tended to rouse him from his unmanly love of ease, and the empress Eudoxia hated the man who dared to reprove openly her illicit amours. The courtiers and ministers of state shared their master's enmity, and only waited for an opportunity to make the archbishop feel the weight of their resentment. Eutropius fell into disgrace and fled for his life to the church of St. Sophia, where Chrysostom gave him a shelter, and protected him against the united rage of the courtiers, the military, and the populace. But it was only for a time. Eutropius was induced to leave his asylum, and perished by the hands of Eudoxia's satellites. She now ruled with absolute sway both the emperor and the empire. Her avarice was equal to her ambition, and she went so far as to take open possession of a vineyard which the owner would neither sell nor give up to her. Chrysostom denounced her from the pulpit as a second Jezebel. This brought matters to a crisis. Theophilus, bishop of Alexandria, who had himself aspired to the succession of Nectarius, found new matter of complaint as well as of hatred against Chrysostom in the toleration which the latter extended to some monks expelled from Egypt and excommunicated on account of their attachment to Origen and his doctrines. This caused the accusation of heresy to be made against the archbishop, although at that time no council had condemned the opinions attributed to Origen. Chrysostom summoned before himself every member of his clergy in order to examine into the scandalous reports about their relations with deaconesses and other women. He reformed or rebuked wherever he found just cause; and thus there was wide-spread discontent among the clergy. It had been reported to him that the episcopal office was bought and sold in the provinces dependent on his patriarchate. In the midst of winter he set out, visiting every diocese, and before he returned to Constantinople deposed 13 bishops convicted of simony and immorality. He even extended his visitation into provinces which owed him no obedience, and there exercised the same rigor against the guilty. This raised a great outcry against him, and gave the advantage to his enemies. Eudoxia and Theophilus

joined hands; and in 403 a council of 36 bishops assembled at Chalcedon, a suburb of Constantinople. There Chrysostom was accused, among other crimes, of pride, oppression of the clergy, inhospitality, avarice, gluttony, undue familiarity with women, and high treason. He refused to appear before his self-constituted judges until their president, Theophilus, and three other bishops, his declared enemies, had been excluded. Meanwhile he continued to give his usual homilies in the cathedral, and the people watched unceasingly his coming and going lest any evil should befall him. He was found guilty and deposed from his see, and a new bishop was appointed by the council and approved by the emperor. At length his house was surrounded in the night by soldiers, and himself borne off into exile at Nicæa. The people on hearing this rose and besieged the imperial palace, demanding his instant recall. An earthquake happened at this very moment, and seemed even to Eudoxia a manifest sign of the divine displeasure. She rushed into the presence of Arcadius and besought him to lose not one moment in bringing back the exiled archbishop. But his return did not cause the court to mend its morals, nor the city to lay aside its love of the most costly pleasures. The connection of the empress with the count John was now a subject of comment in every household, while the courtiers tried to cloak over the scandal by showing new honor to Eudoxia, and she endeavored to divert the attention of the populace by inventing for them new games in the circus. The erection of a silver statue to her in the square adjoining the church of St. Sophia was made the occasion of the most extravagant festivities, at a time when the people were suffering from want. The archbishop publicly reproved the people for their love of dissipation, and as openly blamed those whose vanity had caused this display. The empress took mortal offence, and threatened a second exile. The courtiers, too, replied to the archbishop's denunciation by inaugurating a new feast, in which the honors paid to the statue verged on idolatry. Chrysostom was not to be intimidated. On appearing in the pulpit, he alluded in his commentary on the gospel to Herodias dancing, and demanding as a reward the head of John. The allusion was too transparent. This time the court resolved to take no half-way measures. A second assembly of bishops was summoned, more numerous than the first; and, although 42 among the number were faithful to Chrysostom, he was condemned. In 404, six years after he had been forcibly borne off from his native Antioch to assume the spiritual government of the capital, when every appeal to the Roman pontiff had only increased the rage of his enemies, and the efforts made to assemble a full council had proved abortive, he was compelled to set out for a second exile. Feeble in body, but unbroken in spirit, the high-souled old man traversed Asia Minor, and

took up his abode in Cucusus, a town of the Armenian Taurus. Again the indignant populace arose to demand his recall; but, although in their fury they burned to the ground the senate house and the metropolitan church, the emperor firmly withstood all their clamor. The devoted adherents of the exiled archbishop would not acknowledge while he lived the jurisdiction of any other, and, under the name of "Johannites," they worshipped apart until his remains were brought to Constantinople in 438. For about 18 months Chrysostom resided in Cucusus, when an attack of the Isaurians compelled him to take refuge in the distant stronghold of Arabissus. In the latter place, as in the former, he continued to be the light and life of the Asiatic church. At length a new decree banished him to the remote desert of Pityus. On foot, bareheaded, beneath a burning sun, he was driven pitilessly along by his military escort, until he broke down on reaching Comana in Cappadocia. He felt that the end was at hand; and putting on a white robe, he dragged himself feebly a few miles further to the tomb of St. Basiliscus, where he laid himself down to rest for ever. The surrounding country flocked to his obsequies, and honored his remains as those of a man of God. Thirty years later the entire population of Constantinople, headed by Theodosius II., welcomed the relics back with solemn pomp and rejoicing. —Chrysostom was a voluminous writer. The best edition of his works is that of the Benedictines, in Greek, with a Latin translation (13 vols. folio, Paris, 1718-'38; reprinted in Venice, 1734-'41; in Paris, 1834-'39; and in Migne's *Patrologia*, 1859-'60). A translation into English of his homilies is contained in the "Library of the Fathers" (Oxford, 1842-'53). Most of his works are homilies and commentaries on the Bible. A minute analysis of his writings is contained in Butler's "Lives of the Saints." His biography has been written, among others, by Neander (2 vols., Berlin, 1821-'2; 3d ed., 1848), Perthes (English translation, Boston, 1854), Rochet (Paris, 1866), and Stephens ("St. Chrysostom, his Life and Times," London, 1872).

CHYZANOWSKI, Adalbert, a Polish general, born in the palatinate of Cracow in 1788, died in Louisiana in 1861. He took part in Napoleon's campaign against Russia (1812), and fought at Leipsic (1813), under the walls of Paris (1814), and at Waterloo (1815). After the fall of Napoleon he took service in the national army of Poland, at that time reorganized as a kingdom by the emperor Alexander I., and served under Diebitsch in Turkey (1828-'9). Having been made lieutenant colonel, he was at Warsaw when the Polish revolution of 1830 broke out. Adhering to the provisional government, he was appointed commander of the fortress of Modlin, January, 1831, and subsequently chief of Skrzynecki's staff. He distinguished himself by his defence of the line of the Wieprz, by his victory at Kock, by his successful operations in Pod-

lachia, and by his retreat to and from Zamosc, whence he carried a large park of artillery to the capital. Having been made general of brigade, he was further promoted to the rank of general of division after the victory of Minsk (July 14); but an interview held with Gen. Thiemann, the object of which was not divulged, roused suspicion against him, which was strengthened by his opposition to strong measures, and by the inactivity of Skrzynecki, who followed his suggestions. But in spite of his freely uttered misgivings as to the final success of the struggle, he retained his command, and after the events of the night of Aug. 15 was appointed governor of Warsaw under Krukowiecki. His behavior, however, during the storming of Warsaw, and his staying in the conquered capital, which he was allowed to leave afterward with a Russian passport, seemed to confirm the charges against him. After his arrival at Brussels a formal protest was sent to the Belgian government from the Polish organization in Paris against his reception as a Polish refugee. In 1849, after a lapse of 18 years spent in obscurity, he was chosen by Charles Albert of Sardinia as commander-in-chief, though only with the rank of lieutenant general, in his second war against Austria. His arrangements, which made Novara and the highway to Milan the centre of operations, and neglected the lines of the Ticino and Po, and the unexpected advance of Radetzky, who crossed the Po at Pavia and cut off the corps of Ramorino, combined to produce the disaster of Novara (March 23), which terminated the short campaign and the political career of Charles Albert. Chyzanowski and Ramorino were both charged with treachery, and the latter was executed. Chyzanowski put forth an elaborate vindication of his conduct, returned to Paris in 1850, and some time after emigrated to America.

CHUAPA, a river of Chili, forming the boundary between the provinces of Coquimbo and Aconcagua. It rises on the W. slope of the Andes, near the volcano of Chuapa, and falls into the Pacific, in lat. 31° 38' S., after a W. course of about 125 m. Its chief tributary, the Illapel, joins it on the north near the town of the same name.

CHUB, or *Cheven* (*leuciscus cephalus*, Flem.), a common fresh-water fish, of the family *cypripidae*. It is abundant in almost all the slow-running, soft, clear streams of England; and sufficiently plentiful, of a kindred although distinct species, in similar waters of the United States. (See DACE.) In all modern languages this fish takes its name from the head, which is of somewhat inordinate size. In old English it is called *cop*, in French *têtard*, and in Italian *capitome*. It considerably resembles the carp in form, but is longer and scarcely so thick. The body is oblong, rather round, and of a pretty equal thickness in the greater part of the slope. The scales are large; the irides and cheeks silvery; the head and back of a

deep dusky green; the sides silvery, but in summer yellow; the belly white; the pectoral fins of a pale yellow; the ventral and anal fins red; the tail forked, of a brownish hue, but



Chub (*Leuciscus cephalus*).

tinged with blue at the end. The average weight does not exceed half a pound, though it sometimes weighs more than two pounds. The flesh is little esteemed, being coarse and full of small hairy bones; the roe, however, is excellent; and the head and throat are the best parts, being moderately gelatinous. The haunts of the chub are in rivers whose bottoms are of sand or clay, or which are bounded by clayey banks; particularly in deep holes, shaded by trees, weeds, &c. It frequently floats on the surface, and is sometimes found in streams and deep waters where the currents are strong; in ponds fed by rivulets it grows to a large size. It spawns in April, and is in the best condition in December and January. It affords little sport to the angler, though it will bite freely at the worm, the grasshopper, and the natural or artificial fly; for, when once hooked, the mouth is so tough and leathery that the hook is certain to keep its hold, while the fish has so little pluck or spirit that it will allow itself to be pulled out by main force. It is a shy and wary fish, and is affected by the slightest movement of the water, or by the shadow of anything fleeting over it, as that of a flying bird or a waving bough.

CHUBB, Thomas, an English theological writer, born at East Harnham, Wiltshire, in 1679, died at Salisbury, Feb. 8, 1746. His parents were poor, and gave him very little education; and nearly all his life he followed the business of a tallow chandler at Salisbury. He however acquired considerable general knowledge, and delighted especially in theological studies. When the controversy arose concerning the Trinity, after the publication of Whiston's "Primitive Christianity" in 1711, he wrote an essay entitled "The Supremacy of the Father Asserted." This being replied to, he rejoined with "The Supremacy of the Father Vindicated." He wrote many other tracts and essays, among which were "A Discourse on Reason as a Sufficient Guide in Matters of Religion," "Inquiry about the Inspiration of the New Testament," "The Doctrine of Vicarious Suffering and Intercession Refuted," "On Future Judgment and Eternal Punishment," "Time for Keeping a Sabbath,"

&c. He denied the vicarious suffering of Christ, and the divine authority of the positive institutions of Christianity, but maintained that Jesus was sent by God as a moral instructor. He is included by Leland among the "Deistical Writers in England," and was admired by several prominent men of his day.

CHUCUITO, Chucnyto, or Chuquito. I. A province of the department of Puno, in Peru; pop. about 75,000. It is rich in gold and silver mines, and raises large numbers of cattle.

II. The capital of the province, situated on the W. bank of Lake Titicaca, at the mouth of a small river rising in the Andes, about 15 m. S. E. of Puno and 95 m. E. of Arequipa. In its vicinity are remarkable remains of antiquity. It has greatly declined from its former prosperity, the population, which was about 30,000 in the beginning of the last century, being now only about 5,000.

CHUCK WILL'S WIDOW. See GOATSUCKER.

CHUDLEIGH, a market town of Devonshire, England, on a hill near the left bank of the Teign, 8 m. S. W. of Exeter; pop. in 1871, 6,612. It was almost destroyed by fire in 1807, and has since been rebuilt. It contains a church, several chapels, an endowed grammar school, national schools, and various charities. It is famous for its cider, and once had manufactories of woollens. In the vicinity are quarries of marble and limestone, and some remarkable limestone rocks, with curious caverns pointed out as the abode of fairies.

CHUKCHI. See supplement.

CHUMBUL, a large river of Hindostan, rises in the N. slope of the Vindhya mountains at a height of 2,019 ft., flows N. for some distance, then N. E., and finally joins the Jumna about 90 m. S. E. of Agra. Its total course is estimated at 570 m. Besides other streams, it receives the rivers Sind and Parbuttee, and it is during a large part of its course the boundary between the Rajpoot provinces and Gwalior.

CHUNAR, or Chunargurh, a town and fortress of British India, in the district of Mirzapoor, on the right bank of the Ganges, 16 m. S. W. of Benares, and 395 m. N. W. of Calcutta; pop. about 12,000. It is a place of considerable strength, possesses a small citadel, extensive magazines, governor's house, hospital, and prison. The fort is built on a solid rock which rises abruptly and projects into the river. The church missionary society has a church, and there is a chapel for the use of Roman Catholic soldiers. In 1768 the fort, with its territory, was ceded to the East India company, and was for some time the principal military depot for the Northwest Provinces. It is an invalid station for European troops, although during the sultry season the intense heat renders the place ill adapted for a sanitarium. Outside of the town is the tomb of Kasim Solyman and of his son, who are reputed as saints by the Mussulmans.

CHUND, or Chand, a Hindoo poet, of the Rajpoot tribe, who flourished in the 12th century.

He wrote a poem, said to contain 100,000 stanzas, in which he alludes to or treats of almost all branches of knowledge, and gives a sort of general history of his nation during the period in which he lived, celebrating the exploits of the Rajpoot nobles, and especially of Prithwiraja, the last Hindoo king of Delhi, for whom he acted as court bard. His poems are still very popular among the Rajpoots. Col. Tod published an account of the life and writings of Chund in the first volume of the "Transactions of the Royal Asiatic Society," giving some translations from these poems.

CHUPRA, a town of Bengal, capital of the district of Sarun, British India, situated at the junction of the Ganges and the Gogari, 32 m. N. W. of Patna, and 330 m. N. W. of Calcutta; pop. about 30,000. It has a considerable trade in cotton, sugar, and salt-petre, with towns on the rivers. With the exception of the places of worship and the dwellings of the wealthy native merchants, the houses are built of mud, with tiled roofs. The town has little breadth, but extends a mile along the river. It is only a few feet above the level of the Ganges, which is here navigable during the rains, but inaccessible from October to July.

CHUQUISACA. **I.** A department of Bolivia, between lat. 17° and 21° 25' S., and lon. 62° and 67° W., bounded N. by the departments of Cochabamba and Santa Cruz, E. by Santa Cruz, S. by Tarija and Potosí, and W. by Oruro; area, 72,793 sq. m.; pop. 219,788. The surface is mountainous and in portions arid, but the valleys are noted for fertility and are generally well cultivated, yielding large crops of corn, potatoes, and clover. It is divided into the provinces of Chuquisaca, Cinti, Tomina, and Yamparaes. The province of Chuquisaca is the most northerly and most elevated part of the department, and contains numerous and rich mines of gold and silver.

II. The capital of Bolivia. See **SUCRE**.

CHUR. See **COIRE**.

CHURCH (Gr. *κυριακόν*, consecrated to the Lord; Saxon, *kyrk*; Scandinavian, *kirka*; Slavic, *cerkiew*; Scotch, *kirk*: the common root in these forms did not pass into the Romanic languages, but from the New Testament term *ἐκκλησία*, a congregation, sprang the Lat. *ecclesia*, the Span. *iglesia*, the Fr. *église*, &c.), in its most general sense, the whole collective body of Christians. Its narrower senses are, a body of Christians adopting one creed, and organized under the same ecclesiastical government, as the Anglican church; the Christians of a particular province or city, as the church of Antioch; or a society organized for worship in the same edifice. In the Scriptures the name is also given to the body of Jewish believers, the Jewish church being composed of all those who followed the law of Moses. The Christian church is the society of those who profess the religion of Jesus Christ. The society of the faithful upon earth is usually called

the church militant, and the society of the saints in heaven is called the church triumphant. In the New Testament the name is once applied to a single family of Christians. (See **CHRISTIANITY**.)—Christians have always given the appellation church to the edifices designed for public worship. The ancient churches had an *atrium*, or open space surrounded with walls, before the entrance; in the centre of this there was a fountain, in which all washed their hands or faces before entering the church, as an emblem of the purity of soul which they should possess. Before the door there was a covered court, the roof of which was supported by columns; in this were placed the first class of penitents, who were called *flentes*. In the interior, the part of the church near the door was called the *narthex*; in this the catechumens and the penitents, who were called *audientes*, were placed. Then came the nave, the lower part of which was occupied by the penitents called the *prostrati*; while the laity were arranged, the men on one side and the females on the other, in the remainder of the nave. In the centre was the *ambon*, or pulpit, large enough to contain several persons who acted as chanters. The choir was separated from the nave by *cancelli*, or rails; in this were situated the altar, the throne of the bishop, and the seats of the priests. As it terminated in a semicircle, it was called the *apsis*. A curtain drawn round the altar concealed it from the view of the catechumens, and from those who were unbelievers, during the time of the divine mysteries. (See **ARCHITECTURE**, and **CATHEDRAL**.)

CHURCH, Benjamin, an American soldier in the early Indian wars, born at Duxbury, Mass., in 1639, died at Little Compton, Jan. 17, 1718. He was engaged in several severe skirmishes in King Philip's war, one of which was in a swamp near Bridgewater; and in August, 1676, he commanded the party by which Philip was killed. Commissioned in 1689 as commander-in-chief of an expedition against the eastern Indians, he proceeded up the Kennebec, visited the forts in that vicinity, and rescued Casco for a time. He made four other expeditions against the Indians in Maine, once landing at Maquoit, and thence going to Pejepscot fort, in Brunswick, once again going up the Kennebec, and twice ascending the Penobscot and Passamaquoddy, and doing much damage to the French and Indians on these rivers. Under his direction, and from his minutes, his son Thomas wrote a history of Philip's war (1716; last ed., with notes by H. M. Dexter, 1865).

CHURCH, Benjamin, an American physician, born at Newport, R. I., Aug. 24, 1734, lost at sea in May, 1776. He graduated at Harvard college in 1754, and became very successful as a physician and surgeon. He was also a polished speaker, and the author of several spirited poems. Before the breaking out of the revolutionary war he was a leading whig poli-

tician, a member of the provincial congress of 1774, and of the committee of safety, and became physician general to the patriot army. He lived extravagantly, became pecuniarily embarrassed, and in 1775 was found to be in treasonable correspondence with Gen. Gage. He was convicted of this offence by a court martial over which Washington presided, was expelled from the house of representatives, and imprisoned at Norwich, Conn., by order of congress, and denied the use of pen, ink, and paper. He was released in the spring of 1776, and permitted to embark for the West Indies on account of his failing health; but the vessel was never again heard from. An account of his trial is contained in the "Massachusetts Historical Collections," vol. i.

CHURCH, Fathers of the (*patres ecclesiæ*), those Christian teachers and writers, from the 2d to the 13th century, who were eminent for their orthodoxy, genius, and beneficent influence upon the church. They were preceded by the apostolic fathers, and include several of the scholastic doctors. Protestants usually limit the title to those ecclesiastical writers who lived between the 2d and 6th centuries. That department of theological study which embraces the life, writings, and doctrines of the church fathers is termed patristics or patrology, and is both curious and valuable with reference to exegesis, dogmas, and church history. The most distinguished of the Greek fathers recognized by Protestants are Irenæus, Clement of Alexandria, Origen, Athanasius, Cyril of Alexandria, Basil the Great, Gregory of Nazianzus, Eusebius of Cæsarea, Chrysostom, and Theodoret; of the Latin fathers, Justin Martyr, Tertullian, Lactantius, Cyprian, Hilary of Poitiers, Ambrose, Augustine, Jerome, and Gregory the Great. The Roman Catholics exclude from this list Tertullian, Origen, and Eusebius, on account of the heterodoxy of some of their works, but add to it John of Damascus, Peter Damian, Anselm, Bernard, Thomas Aquinas, Bonaventura, and others of the early mediæval theologians. Most of the patristic writings have been several times edited separately, and the careful Benedictine editions are still esteemed among the best. Of the general collections, the most important are the *Maxima Bibliotheca Veterum Patrum* (27 vols., Leyden, 1677), containing the Greek fathers in a Latin translation, and valuable notices of mediæval theologians; the *Bibliotheca Veterum Patrum et Antiquorum Scriptorum Ecclesiasticorum*, by Galland (14 vols., Venice, 1765-'81); the *Patrologiæ Cursus Completus*, by the abbé Migne (the most extensive of all collections, in 389 vols., Paris, 1840-'67); and the collection by Cardinal Mai, *Nova Collectio* (10 vols. 4to, Rome, 1825-'38), *Spicilegium Romanum* (10 vols. 8vo, 1839-'44), and *Nova Patrum Bibliotheca* (7 vols. 4to, 1844-'53). A collection by Combefis, *Bibliotheca Patrum Concionatoria* (8 vols. fol., Paris, 1662), was to be republished in 30 vols. 8vo, but only the first volume has

appeared (1852). Collections of extracts were made by Grabe (Oxford, 1698), Rösler (Leipsic, 1776-'86), Guillon (Paris, 1833-'40), and Thilo (Leipsic, 1853-'4). Among the best aids to patristic studies are Möhler's *Patrologie* (Ratisbon, 1839-'40), Engelhardt's *Leitfaden zu patristischen Vorlesungen* (Erlangen, 1822), and Charpentier's *Études sur les pères de l'Église* (Paris, 1853). In 1839 a "Library of Translations from the Fathers," edited by E. B. Pusey, John Keble, and C. Marriott, was commenced at Oxford, of which about 40 volumes have appeared.

CHURCH, Frederick Edwin, an American landscape painter, born in Hartford, Conn., May 4, 1826. He was a pupil of Thomas Cole for two years. Among the works which first brought him into notice was a view of East Rock, near New Haven; and a number of scenes in the Catskill mountains added to his reputation. In 1853 he went to South America, visiting New Granada and Ecuador, where he obtained material for a number of pictures. His views of the great mountain chains of those countries attracted much attention for their careful elaboration and warmth of color. He made a second journey to South America in 1857, and brought back a large number of sketches, from which he produced his "Heart of the Andes," "Cotopaxi," "On the Cordilleras," and other pictures, which gave him a high rank in his profession. In 1858 he painted a large view of Niagara Falls, representing the Horseshoe Fall as seen from the Canadian shore near Table Rock, which is generally regarded as his masterpiece. This picture he reproduced on a larger scale in 1868. He afterward went to Jamaica, to make studies of tropical scenery, and in 1868 visited Europe and the Holy Land. His large picture of "Damascus" was painted in Rome in 1869, his "Jerusalem" in New York in 1870, and his "Parthenon" also in New York in 1871. His "Tropical Scenery," painted from sketches taken during his West Indian trip, was exhibited in New York in 1873. It is much smaller than many of his canvases, being only about 40 inches in length, but exhibits many of his best characteristics. Mr. Church resides near Hudson, N. Y., but has his studio in New York city, and was formerly one of its commissioners of parks.

CHURCH, John Hubbard, D. D., an American clergyman, born at Rutland, Mass., March 17, 1772, died at Pelham, N. H., June 13, 1840. He graduated at Harvard college in 1797, and was for nearly 40 years pastor of the Congregational church of Pelham. He was devoted to benevolent enterprises, and was officially connected with Dartmouth college, Andover theological seminary, Phillips academy, and with various missionary, Bible, and tract societies, which he served with great zeal and efficiency. He published about 25 sermons, besides various articles in religious periodicals.

CHURCH, Sir Richard, a commander in the Greek war of independence, born in England in 1780, died in Athens, March 20, 1873. He

entered the army in 1800, and having spent many years in the British and Neapolitan service, and held in 1813 the command of a Greek infantry corps, he in 1827 joined the Greeks in their struggle for independence. He was appointed commander-in-chief of the Greek forces, and ordered by the national assembly of Troezen to march to the relief of Athens. His attempt to raise the siege failed, partly from want of prudence, partly from the dissensions which sprang up among the Greek chieftains. He continued in the service of Greece till 1829, when, owing to his being a foreigner, and to the personal hostility and jealousy of Capo d'Istrias, he was forced to resign. He retired to Argos, and was living in obscurity when he was ordered in 1830 to leave the Greek territory. He remained, however, and when Capo d'Istrias was assassinated in the following year, he was again placed at the head of the army, though he continued to oppose the administration of Augustin Capo d'Istrias, who had succeeded his brother as president. On the establishment of the kingdom of Greece he was appointed a councillor of state, afterward became a member of the senate, and remained for many years at the head of the Greek army and navy. His death was honored by a national mourning.

CHURCH, Sanford Elias. See supplement.

CHURCH OF ENGLAND. See ENGLAND, CHURCH OF.

CHURCHILL, a W. central county of Nevada; area, 5,800 sq. m.; pop. in 1870, 196, of whom 16 were Chinese. Carson, Humboldt, and Walker rivers water portions of the county. Near the centre is a depressed basin, in which lie the "sinks" or lakes of Carson and Humboldt rivers. In this basin are found salt, bicarbonate of soda, and other like substances. Much of the surface is mountainous. The arable land along the streams amounts to about 50,000 acres; the grazing lands are more extensive. There is also some land that might be made productive by irrigation, but the greater part is unfit for agriculture. The Central Pacific railroad passes through the N. W. part. Gold and silver are found. There is one quartz mill for the production of gold, with 10 stamps and 3 arrastras. The chief productions in 1870 were 559 tons of hay, 7,145 bushels of barley, and 2,224 lbs. of wool. There were 130 horses, 137 milch cows, 741 other cattle, and 772 swine. Capital, Stillwater.

CHURCHILL, called also Missinippi and English River, a river of British America, rises in Lake Methy, flows S. E. through Lakes Buffalo and La Crosse, runs thence almost due E. to Nelson's lake, and after traversing a woody region in a N. E. direction and expanding into considerable sheets of water, falls into Hudson bay. It is about 700 m. long.

CHURCHILL, Charles, an English poet, born in Westminster in February, 1731, died in Boulogne, Nov. 4, 1764. He studied for a time at Trinity college, Cambridge, but did not

graduate. At the age of 17, although without any means of subsistence, he married, and his father, a curate and lecturer at Westminster, took him and his wife into his house and supported them on condition of his adopting the clerical profession. In 1756 he was ordained, and, having first held a curacy in Somersetshire, was afterward inducted into a small country preferment which belonged to his father. In 1758, on the death of his father, he succeeded to his curacy. During this period he was exemplary in his conduct, although he himself declares that he was doing violence to his own feelings, and that he was but an idle pastor and drowsy preacher. Differences with his wife, increasing debts, and finally the evil example of a young friend, the poet Robert Lloyd, plunged him into all the dissipations and irregularities of the town. He was compelled to give up his curacy, and was only saved from incarceration by the interposition of his friend's father, Dr. Lloyd, a master in Westminster school. His first poem, published in 1761, was the "Rosciad," a satire on the theatrical world of the day. The criticisms upon this performance drew out the stinging "Apology to the Critical Reviewers," in which he attacked the wits as he had the players. In 1762 he associated himself with Wilkes, and wrote frequently for the "North Briton." The "Prophecy of Famine," a satire on Scotchmen, directed against the Bute administration, attained great popularity. He was involved in the proceedings against the "North Briton," in which Wilkes defended the liberties of the subject against the stretch of kingly prerogative. He defended his profligate course in "Night," and wrote also "The Duellist," "The Author," "Gotham," "The Candidate," "The Farewell," "Epistle to Hogarth," "The Times," and many other satirical pieces. He died while on a visit to Wilkes, and was buried at Dover. "No English poet," says Southey, "had ever enjoyed so excessive and so short-lived a popularity; and indeed no one seems more thoroughly to have understood his own powers; there is no indication in any of his pieces that he could have done anything better than the thing he did." His complete works were published in 1804.

CHURCHILL, John. See MARLBOROUGH, DUKE OF.

CHURCHMAN, William H., a blind man, superintendent of several institutions for the instruction of the blind, born in Baltimore, Md., in 1818. As a pupil of the Pennsylvania institution for the blind, he acquired a good mathematical education, and attained proficiency in music. In 1840 he became an assistant teacher of music and other branches in the Ohio institution for the blind at Columbus. In 1844 he was appointed principal of the Tennessee institution for the blind. He resigned after two years' service in consequence of ill health, and in 1847 was chosen superintendent of the Indiana institution for the blind at Indianapolis,

over which he presided till 1853. The ensuing year he established a young ladies' seminary at La Porte, Ind., which, after a little more than a year of successful progress, was broken up by the destruction of the buildings by fire. He received soon after the appointment of superintendent of the Wisconsin institute for the blind, at Janesville.

CHURCH RATE, a tax imposed on the parishioners and occupiers of land in a parish of England for church repairs. The tax is proposed by the church wardens, and must be voted by a majority of the parishioners in vestry assembled. It is distinct from tithes, from which in early times the repairs were made. Before the reformation the levy of church rates might be compelled by spiritual censures and punishments, but since then it has been generally understood to rest entirely in the discretion of the parishioners. Recently, however, in the Braintree case, and the case of St. George's, Colgate, Norwich, efforts were made to compel the payment of a levy made by the wardens where the parish had refused to vote it, and to punish parishioners who had voted against the tax; but in each instance without success. The decisions in these cases strengthened the opposition of dissenters and others, which previously had been troublesome, and at length, by statutes 31 and 32 Victoria, c. 109, the payment of church rates was made no longer compulsory. The rate was abolished in Ireland in 1823. In Scotland the burden of church repairs is by custom on the heritors or owners of land in the parish subject to ecclesiastical charges.

CHURN, a vessel in which cream is agitated to separate the butter from the other portions. It has various forms, the simplest and most generally preferred being the common dash churn, which is either a cylindrical or barrel-shaped vessel, standing upon one end and having a cover fitted to the other, with a hole in its centre for the passage of the handle of the dasher. This is the instrument for producing the agitation of the cream, and consists of a wooden rod a little more than an inch in diameter and from three to four feet long, having two boards attached crosswise at the lower end, of a length somewhat less than the diameter of the churn. The form and size of these cross pieces are important, as upon them depends the proper agitation of the cream. The motion which has been found to give the best results in churning is that which produces a thud or shock, such as would be given if a keg or small slender barrel, partly filled with a liquid and suspended in a horizontal position by both ends, were swung in one direction, endways, and then suddenly stopped; and, indeed, this form of churn has been used in Holland, England, and the United States, and for making small quantities of butter is probably the best. It is called a swing churn. An ingenious contrivance for imparting a similar motion to the contents of the churn has been invented in England. It

consists in revolving a barrel-shaped vessel upon a diagonal axis, by means of which each end is alternately raised and lowered, thereby throwing the cream from one end to the other. Wheel churns of an almost endless variety have been invented, and some of the simpler forms answer the purpose intended very well; but they are all inferior to the dash and swing churns. Some combine aëration with agitation, by forcing streams of air through the cream; but such contrivances are now regarded by all good butter makers as worse than useless, because, although they may quickly effect the rupture of the butter globules, they incorporate the sacs and other portions with the butter, rendering it liable to become rancid by fermentation. The design in many of the inventions has been to hasten the operation of churning; but it has been found that when cream is in the best condition for making butter, the time occupied should be from 40 minutes to one hour. (See BUTTER.)

CHURRUCA Y ELORZA, Cosme Damian de, a Spanish naval officer, born at Motrico, in the province of Guipuzcoa, Sept. 27, 1761, died at Trafalgar, Oct. 21, 1805. He distinguished himself at the siege of Gibraltar in rescuing some of the survivors from the floating batteries, after the latter had been destroyed by the English. Having received an appointment in a Spanish surveying expedition to the strait of Magellan, he wrote an admirable diary of his exploration of Tierra del Fuego, which was published at Madrid in 1793. In 1791, being then in command of a frigate, he was placed at the head of an expedition fitted out for the purpose of surveying the coasts of the gulf of Mexico. The war which soon after broke out between Spain and France interrupted this work, and compelled Churruca to leave his task unfinished; but he had already completed 24 charts of the coasts of Cuba, Hayti, Porto Rico, &c., some of which have since been published. He was afterward sent as an envoy to Brest, and was received with distinction by Napoleon, then first consul. In October, 1805, he was in command of a frigate at Cadiz, and shortly before the battle of Trafalgar wrote to a friend, "If you hear that my ship is taken, know for certain that I am dead." In that battle, his leg having been shot away by a cannon ball, he died three hours afterward.

CHURUBUSCO, a small village about 6 m. S. of the city of Mexico, on the Rio de Churubusco, at which a battle between the Mexicans under Santa Anna, and the Americans under Scott, was fought Aug. 20, 1847. It contains the massive convent of San Pablo. The road to Mexico is an elevated and paved causeway crossing the river by a stone bridge. The banks of the stream have been raised and planted with trees. At this point Santa Anna took a determined stand after the battle of Contreras, to intercept Scott's advance toward the capital. The Americans carried the place after a sharp action. The engagements at

Contreras and Churnbusco were fought on the same day, and actually formed one battle. In both actions the American loss was 139 killed and 926 wounded. The Mexican loss was about 4,000 killed and wounded, 3,000 prisoners, 37 pieces of ordnance, many small arms, and much ammunition. The battle of Chapultepec, Sept. 13, was the closing action in this campaign. (See CHAPULTEPEC.)

CHUSAN, or **Chowsan** (boat-like), a group of islands, consisting of one large island with a great number of smaller ones, off the coast of China, about lat. 30° N., lon. 122° E. They are beautifully wooded, abound in floral productions, and contain numerous excellent harbors. The largest island, called also Chusan, is about 50 m. in circumference; pop. about 250,000. The land is carefully cultivated, and rice, wheat, sweet potatoes, chestnuts, walnuts, tobacco, tea, silk, and cotton are produced. The climate is temperate and healthful except in the summer months. Chusan is an intermediate port between Japan and the Chinese ports of Ningpo, Hangchow, and Shanghai. In 1840 the British seized the islands, and held them for a time. As stipulated in the peace in 1842, they were evacuated in 1846, and Hong Kong was ceded to the British in their stead. They were occupied by the British again in 1860, but evacuated the same year. The capital is Tinghai, a walled town about 2 m. in circumference, containing some fine specimens of Buddhist temple architecture.

CHYLE (Gr. *χυλος*, juice), the white, opaque, milky-looking fluid formed in the lymphatic vessels of the small intestine during digestion. The lymphatic vessels of the whole body absorb from the tissues in which they are distributed a watery fluid, containing albumen, fibrine, and saline matters in solution. In addition to these substances, however, the lymphatics of the small intestine, while digestion is going on, absorb from them the fatty ingredients of the food. These substances have been reduced by the digestive process to the state of an emulsion; that is, to the condition of finely comminuted particles or granules, less than $\frac{1}{100,000}$ of an inch in diameter, which are held in suspension in the watery or serous parts of the fluid. It is these exceedingly abundant and finely divided oleaginous granules which give to the chyle its opaque white color; and the intestinal lymphatics are therefore called the lacteals, or milk-bearing vessels. The chyle, collected from the intestine by the lacteals, is conveyed to a pouch or dilatation, situated at the posterior part of the abdomen, called the *receptaculum chyli*, whence it is conveyed upward through the chest by a special vessel, the thoracic duct, and finally discharged into the left subclavian vein at the root of the neck. The abundance of the chyle varies with the activity of digestion and the amount of fatty matters present in the food; in the human subject its average quantity is estimated at about 2½ pounds per day.

CHYME (Gr. *χυμος*, sap, moisture), a term formerly applied to the semi-fluid mass of the food which has undergone digestion in the stomach, and is about to pass into the small intestine. It is now known that the food in this condition is simply a mixture of various substances, some of which have undergone complete or partial digestion by the gastric juice, while others are still unaltered, and require the action of other secretions before their digestion will be accomplished. The term chyme, therefore, does not represent any definite substance, and is accordingly seldom employed by physiologists at the present day.

CIALDINI, **Enrico**, an Italian soldier, born near Castelvetro, Aug. 8, 1811. He is the son of a hydrographical engineer and a Spanish lady. Expelled from the Jesuit college at Reggio on account of his irreverence, though displaying precocious talents, he was sent to Parma to study medicine and the art of design, but joined the revolutionary movement of 1831, and was obliged to take refuge in Paris, where he continued his medical studies, and supported himself by translating into Italian some writings of Voltaire and Rousseau, and some of Velpeau's surgical works. In 1833 he fought in Portugal for Dom Pedro, and in 1835 he entered the Spanish service against Don Carlos, rising to the rank of lieutenant colonel. After the war he served for some time as adjutant of Narvaez at Valencia, where he married a Spanish lady. He was sent to Paris to report upon the organization of the French police, and after the outbreak of the revolution of 1848 joined Gen. Durando at Vicenza. Being severely wounded (June 10), he fell into the hands of the Austrians, but was set free early in 1849, after his partial recovery. He afterward fought against the Austrians as commander of a corps chiefly made up of volunteers. In the Crimean war he became brigadier general, Aug. 1, 1855; and on his return to Turin the king appointed him his aide-de-camp, though that rank is generally conferred only on noblemen. In 1859 he organized the Garibaldian corps of Alpine sharpshooters, and commanded the 4th division of the army, attaining the rank of general of division (June 1) in reward for his services especially at the battle of Palestro. In 1860 he commanded in the brilliant campaign which resulted in the utter defeat of the papal army under Lamoricière at Castelfidardo (Sept. 18), and in the capture of Ancona and other important places, after which he was made general of the army (a rank corresponding to that of marshal in France), simultaneously with Garibaldi and Fanti. On Feb. 13, 1861, he compelled the surrender of Gaeta, and on March 13 that of the citadel of Messina, thus closing the war in southern Italy and Sicily. He declined the titles and pensions offered to him, accepting only a crown of laurel in token of national gratitude. He was elected member of parliament for Reggio, but went in 1861 as lieutenant of the king to Naples, where he did

much to extirpate pseudo-political brigandage. When Garibaldi began his revolutionary movement of 1862, Cialdini was sent to Sicily to preserve order in that island; but the defeat of the former at Aspromonte put an end to this mission, and he resumed the military command of Bologna. In 1864 he became a member of the senate, and urged the removal of the capital to Florence as a strategical necessity. In February, 1865, the king appointed him military commander at Turin. In 1866, as commander of the 4th corps, he operated along the lower banks of the Po, with a view of cutting the Austrian communications east of the quadrilateral. After the disastrous battle of Custoza he was obliged to fall back upon Bologna and Piacenza; but after the battle of Sadowa he was of some service in hastening the retreat of the Austrians toward Tyrol. He succeeded La Marmora as chief of staff, and declined in October, 1867, the mission to Vienna. When Rattazzi's cabinet was broken up on account of the differences with France, the king requested Cialdini to form a new cabinet; but his efforts were unavailing, and in November he became commander-in-chief of the troops in central Italy. In 1869 he had bitter controversies with La Marmora in respect to the disastrous campaign of 1866, and he soon retired from the army in order to be entirely independent as one of the leaders of the opposition in the senate against Lanza's administration. He was one of the signers of the act by virtue of which the throne of Spain was accepted by Amadeus, whom he accompanied as extraordinary ambassador to Spain, but without any official title. In February, 1873, he was sent on a special diplomatic mission to France.

CIBAO, a mountain range nearly in the central part of Hayti, extending about 90 m. N. W. and S. E. The highest summits, forming the culminating peaks of the island, are more than 7,000 ft. high. E. and S. E. of these mountains is an excessively rugged and almost deserted tract; but between the range along the N. shore, from the bay of Monte Christi on the west to Vieux Cap Français on the east, and the Cibao mountain, there is an extensive and fertile valley watered by the Yaque, and known as the plain of Santiago. The principal rivers of the island, as the Neyva, Artibonite, Yuma, and Monte Christi, rise in these mountains; and gold has been found here.

CIBBER. **I. Caius Gabriel**, a sculptor, born in Holstein about 1630, died in London about 1700. He went to England during the protectorate of Cromwell, and was employed to execute the bassi rilievi on the pedestal of the London monument. He is principally known as the sculptor of the two figures representing raving and melancholy madness, which adorned the principal gate of old Bethlehem hospital, and are now preserved in the new hospital in St. George's Fields. He was in later life employed by the duke of Devonshire in the improvement and decoration of his family seat at

Chatsworth, and built the Danish church in London at his own expense. **II. Colley**, an English poet and dramatist, son of the preceding, born in London, Nov. 6, 1671, died Dec. 12, 1757. After serving as a volunteer in the cause of William of Orange, he commenced his career as an actor in 1689. His success was for many years very indifferent, but he at last attained popularity in the personation of feeble old men and fops. He wrote and adapted about 30 plays of various descriptions, among which are "Love's Last Shift," "Love Makes a Man," "She Would and He Would Not," "The Careless Husband," "The Nonjuror" (his best play, an adaptation of Molière's *Tartuffe*, on which Bickerstaff afterward founded his "Hypocrite"), "The Provoked Husband," and the modern acting version of "Richard III." He also wrote an autobiography, under the title of an "Apology for his Life." He was one of the managers of Drury Lane theatre from 1711 to 1730, and was then appointed poet laureate, in which character he figures as hero of the "Dunciad." **III. Theophilus**, an English actor and author, son of the preceding, born Nov. 26, 1703, died in October, 1758. He appeared on the stage in 1721, and met with some success; but his irregular habits prevented any systematic effort, and he was generally in want. He early married an actress of the name of Johnson, and after her death married Miss Arne in 1734. His extravagance obliged him to retire to France in 1738, and on his return he separated from his wife under very discreditable circumstances. In 1758 he made an engagement with Mr. Sheridan at the Dublin theatre, but perished by shipwreck while crossing the Irish channel. He wrote and adapted several plays, and was concerned with a work entitled "Lives of the Poets of Great Britain and Ireland to the Time of Dean Swift" (5 vols., London, 1753), the authorship of which is claimed for a Scotchman named Shiel, who purchased from Cibber the privilege of using his name upon the title page. **IV. Susannah Maria**, an English actress, wife of the preceding, born in 1716, died Jan. 30, 1766. She was educated in music by her brother, Dr. Arne the composer, made her first public appearance as a singer, and after her marriage performed in tragedy. She is still reputed among the great actresses of the English stage. Handel was so enthusiastic in his admiration of her that he composed parts expressly to suit her voice, and himself instructed her in singing them. Garrick is said to have exclaimed when he heard of her death, "Then tragedy has expired with her." She was buried in Westminster abbey.

CIBOT, **François Barthélemy Michel Édouard**, a French painter, born in Paris, Feb. 11, 1799. He studied with Guérin and Picot, and painted history, portraits, and genre subjects. Among his works are "Judith going to the Camp of Holofernes," "The Origin of the Sacred Heart," in the church of St. Leu, "The Burial

of Godfrey de Bouillon," "The Victory of Raymond Dupuy," "The Defence of Beauvais," in the gallery of Versailles, "Spring," "Summer," &c. He obtained a medal of the second class in 1836, of the first class in 1843, honorable mention in 1855, and in 1863 the decoration of the legion of honor.

CIBOT, Pierre Martial, a French Jesuit missionary in China, born at Limoges in 1727, died in Peking, Aug. 8, 1780. He was educated in Paris, and distinguished himself by his fine scholarship. He set out for China in 1758. First admitted into the household of the emperor as a gardener, his learning and talent soon gained for him the position of court mathematician. He conceived the project of explaining the Old Testament through a connection between the history of the Jews and Chinese, and wrote a long commentary on the book of Esther in pursuance of that object. Extracts from this, and a large number of his dissertations, are contained, with those of Amiot, in the *Mémoires concernant les Chinois*.

CIBRARIO, Luigi, an Italian statesman and historian, born in Turin, Feb. 23, 1802, died at Salò in the province of Brescia, Oct. 1, 1870. He took his degree as doctor of civil and canon law in 1824, and devoted himself during a great portion of his life to historical research. He was for many years in the service of King Charles Albert of Sardinia, and was sent by him on diplomatic missions to Switzerland, France, and Austria. In 1848 he took possession of Venice as commissioner of Sardinia, and the same year became a member of the senate. After the abdication of Charles Albert in 1849, he was sent to Oporto to endeavor to induce the king to return, and wrote an account of that unsuccessful mission. He became a member of Victor Emanuel's cabinet in 1852, as minister of finance, and in 1855 was minister of foreign affairs under Cavour, which post he held during the Crimean war. In 1860 he became minister of state, and in the following year received the title of count. His historical works include histories of Turin, Geneva, and the kingdom of Savoy, notices of the princes of Savoy, a life of Charles Albert, and an account of the political economy of the middle ages. He also published several volumes of novels, and editions of Petrarch and other eminent Italian writers.

CICACOLE, or **Chicacole**, a town, fort, and cantonment of British India, presidency of Madras, in an ancient district of the same name, one of the five Northern Circars, 110 m. S. W. of Ganjam and 445 m. N. E. of Madras; pop. about 12,800. The town, situated on the left bank of the Naglaudee, a few miles above its mouth in the bay of Bengal, is a straggling place with narrow crooked streets and houses built of mud. There are several mosques, one of high reputed sanctity, and a number of bazaars of considerable importance. The manufactures are chiefly of common cotton goods and of fine muslins, the latter rivalling

those of Dacca in Bengal. The fort, N. of the town, is completely dismantled, its walls and ditch being hardly traceable. It contains the regimental offices. The encampment is about 100 yards S. E. of the fort. At the corner of the parade ground is a small church, and the London missionary society has a school within the town, where English is taught. There are also several native schools.

CICERO, Marcus Tullius, a Roman orator, statesman, and philosopher, born at Arpinum, Jan. 3, 106 B. C., assassinated Dec. 7, 43 B. C. He belonged to an equestrian family, and with his brother Quintus was educated at Rome by eminent teachers, among whom was the poet Archias. At the age of 17 he attached himself to Quintus Mucius Scaevola, the augur and pontifex, to study law and politics; he studied the Epicurean philosophy under Phædrus. The social war interrupted these pursuits, and he was obliged to serve in the army; but at its close he returned to his studies. He was a pupil of Philo the Academic, and became familiar with the Stoic philosophy under Diodotus, who lived in his house; in rhetoric his teacher was Molo of Rhodes. He made his first appearance as an orator in a civil suit; but his infirm health stopped him at the beginning of his career, and for its restoration he travelled in Greece and Asia in 79-'8. At Athens he became acquainted with Atticus, a Roman knight, whose friendship he enjoyed until his death; at Rhodes he met Molo, and again placed himself under his tutorship, overcoming his violent manner of speaking, which his feeble frame was unable to bear. He returned to Rome refreshed in body and mind, and from this time may be dated his public career. In 75 he was quaestor under Sextus Peducaeus, prætor of Sicily, where he ruled with the greatest justice, beloved by all the people. In 70 he brought his accusation against Verres for extortion in Sicily. In 69 he was ædile, in 66 prætor, and in 63 consul. His consulship has been rendered immortal by the suppression of Catiline's conspiracy, for which he was styled *pater patriæ*. But here he laid the foundation for his own destruction. Hatred, envy, and his own boasting had made him many enemies, especially Clodius, whom he had mortally offended, and, unable to endure the shocks of party strife, he left Rome in 58; the enraged people burned and destroyed his house and villas. At this period Cicero yielded to the most unmanly despair, and showed himself of a weak and timorous disposition. In 57, however, his party regained power, and he returned with great joy, Lentulus and Spinther being consuls, and Milo, the opposer of Clodius, tribune. The forum and senate became again the theatres of his actions for many years. In 53 he was chosen into the college of augurs, and in 52 he defended Milo. In 51 he was proconsul of Cilicia in Asia Minor, which he governed with the strictest justice; in this

province he proved his military talents in repelling and conquering the enemy, but was displeased on his return to Rome in not obtaining a triumph. At this time the disputes between Cæsar and Pompey were at their height, and Cicero joined the latter; yet after the defeat of Pompey at Pharsalia (48), he came to Rome at the invitation of Cæsar. He then devoted himself to philosophy until the death of Cæsar in 44; after this he again mingled in the political strife of the times, and in his 14 philippics attempted the ruin of Antony. But his enemy was too powerful, and when the new triumvirs, Antony, Lepidus, and Octavius, made out the list for their proscription, Cicero was upon it, among the most prominent of the intended victims. Octavius permitted him to be slain by Antony to gratify his revenge, though he might have prevented it by his personal authority. He fled from his Tusculan villa, where he was residing, but was overtaken by the hired assassins of the triumvirate near Formiæ, and killed in his litter, meeting death with more bravery than he had shown in anticipating it. It happened that the man who severed his head from his body, the leader of the assassins, was one whom Cicero had successfully defended. Cicero was married for the first time in 77, just before his travels, to Terentia, by whom he had a son, Marcus, and a daughter, Tullia; he was divorced from her in 46, and married Publilia, a rich lady, from whom he was divorced on account of her rejoicing at the death of her stepmother. His son Marcus was honored by Augustus, but was according to all accounts a worthless and intemperate man, in every way unworthy of the noble philosophy addressed to him by his father in his *De Officiis*. Cicero's brother Quintus died about the time of the orator's assassination from the persecution of Antony. In 1544 a monument was discovered in the island of Zante, supposed to have been the tomb of Cicero, but it is generally believed that he was buried in his academic villa in Italy.—In person Cicero was tall and slender, feeble, but strengthened by temperate habits; in his disposition he was amiable and cheerful, firmly attached to his family and friends, generous in the extreme, and seldom influenced by malice or envy. He was very rich, but his riches were of his own acquiring; he was neither extravagant nor avaricious. He possessed no fewer than 14 villas in different parts of Italy, whither he retired to devote himself to study and meditation. The most celebrated was the one called Puteolanum, on the site of the modern Pozzuoli, also named after the academy at Athens; after his death it fell into the hands of strangers, and among others of the emperor Hadrian, who changed it into a palace, in which he died. The virtues of Cicero far outnumbered his vices and foibles; he was undoubtedly deficient in prudence, decision, and fortitude, but the chief charge against him has been vanity. The love of ap-

probation was the mainspring of his best as well as some of his least noble deeds; his courage would have been insufficient, without this aid, to lead him to enter upon his most difficult tasks, especially the suppression of Catiline's conspiracy. This vanity led him into his worst errors. As a statesman he dearly loved his country, and throughout his whole political career he was a true patriot. As a scholar his learning was remarkable not so much for originality as for extent; his reading embraced every department of knowledge; he attempted almost every branch of literature, and with success; but eloquence was the field in which he best displayed his ability. He possessed some poetic talent, but did not, as far as is known, much cultivate it. Of his merit as a historian no judgment can be formed, as none of his works of this class are extant. In philosophy he was a sound thinker, and a well-read and acute reasoner; one of his great merits in this department is the beautiful extension of the imperfect ideas of others in a language peculiarly his own. In law he displays much knowledge, and to the moderns he is a very important authority in regard to Roman jurisprudence, many points of which are discussed in his orations.—The works of Cicero may be divided into four classes: rhetorical, oratorical, epistolary, and philosophical; many of the last three classes, and all of his poetical writings, are lost. It may appear strange that few of the writers of the Augustan age mention the works of Cicero; but this is easily accounted for when we consider the peculiar circumstances of their situation in regard to Augustus, who was somewhat jealous of his newly acquired power. Livy and Asinius Pollio give unqualified praise to Cicero; and in the subsequent periods of Roman literature he was much praised by all; even the Latin fathers extol him, and abound in quotations from his works. His literary merits are of the highest class; his Latin is of the purest; his style harmonious and pleasing, neither too ornamental nor too plain. In the middle ages Cicero was absolutely idolized; there was a class of writers whose aim it was to acquire the language of Cicero, and who would hear or speak of nothing but him; they carried their whim so far as to style themselves "Ciceronians," among whom were many of the learned men of the times. Erasmus at last opposed this "Ciceromania," not because he did not like Cicero, but in order to keep the admiration of him within proper limits. The *editio princeps* of his works was published at Milan 1498; the best edition is perhaps that of Grovius, at Leyden, 1692; others are those of Ernesti, 1777; of Olivet, Paris, 1749; and of Orelli, Zürich, 1826-'46. Cicero's rhetorical works are the result of his Greek instruction, diligent study, and long experience. He defines eloquence as "the art of gaining others to our opinion;" a definition which, as Quintilian says, is rather too limited. The first work in the

class of rhetoric usually contained in the writings of Cicero does not belong to him; it is entitled *Rhetoricorum ad C. Herennium libri quatuor*. The opinion that this belonged to Cicero arose from quotations in the Latin fathers as his; Quintilian quotes similar passages as coming from Cornificius. Leaving Cicero out of the question, opinions vary as to the writer; some ascribe it to Tullius, others to Tiro, and some to Cicero's son Marcus. The second work is *De Inventione Rhetorica*, in two books, written in his youth; it is considered of no importance even by Cicero himself; it seems to be notes of lectures, and this and the preceding may be merely minutes taken by two individuals of the same course of lectures. The third is *De Oratore libri tres ad Quintum Fratrem*, written about the year 55; it is a dialogue between distinguished orators of the age preceding his own, when Crassus and Antonius flourished; his object was to set up his ideal of an orator, and to prescribe the course of education; he is not so lively as Plato, but yet is very pleasing. He attached some value to it, and it is the more interesting as it shows his own manner of education; it is written with great art, ease, and grace, and abounds in beautiful digressions, as that on wit, in the second book. It is one of the most perfect of his works. The fourth is *Brutus, sive de Claris Oratoribus*, written in 46, after his return from Pharsalia; this is also in the form of a dialogue, and is very important as a history of Roman eloquence; it has also a short preface on the eloquence of Greece. The fifth is *Orator, sive de Optimo Dicendi Genere*, addressed to Brutus, in which he delineates the perfect orator. The sixth is *Topica*, addressed to Trebatius, published in July, 44, just after the death of Cæsar; it was written on a journey to Rhegium, in compliance with the request of Trebatius that he would make him a manual on legal arguments; it is an abstract of the "Topics" of Aristotle, which Trebatius was unable to comprehend. This is the same Trebatius whom Horace consults as to whether he should write satires or not. The seventh is *De Partitione Oratoria*, a dialogue between Cicero and his son; it was written about 46, and is a manual of rhetoric, treating of the doctrine of arrangement according to rhetorical rules. The genuineness of this has been questioned, probably on account of its numerous defects. The last is *De Optimo Genere Oratorum*, a small work, a preface to translations of two orations of Demosthenes and Æschines; he had been charged with belonging to the Asiatic school, and he here vindicates himself, and shows the best kind of eloquence.—The second class of Cicero's works consists of his orations; many of these have not come down to us, either because they were not delivered after they were prepared, or because they were not written down until a long time after they were delivered; many fragments of single orations leave no doubt of the excellency of those which have been lost.

In his orations Cicero discusses matters of state and of private life, and affords invaluable sources of information regarding the public and domestic usages of Rome. His 1st oration in public was *Pro P. Quintio*, in which he defeated his rival Hortensius, delivered in September, 81 B. C. The 2d, *Pro Sexto Roscio Amerino*; this was his first criminal case, in which he refutes the charge of murder brought against his client, in the year 80; Cicero displayed considerable courage in the management of this case, as in it he was opposed to the dictator Sulla, and had to deal with many delicate political relations; he gained his case, and with it great fame. The 3d, *Pro Q. Roscio Comedo*, delivered in 76; in this he defends the great actor, who had been sued for debt; the beginning of this oration is lost. The 4th, *In Q. Cæcilium*, a kind of preface to the accusation of Verres, in the year 70; Cæcilius claimed the right to accuse Verres. The 5th, *In Verrem*, divided into two parts: the first *actio* is the introduction, in which he brings forward the proofs of Verres's guilt, in one oration; the second *actio* consists of several orations, in which he gives an account of Verres's crimes; these were not delivered, as the accused withdrew his cause after the first *actio*, and went into voluntary exile; Cicero, however, published them. The 6th, *Pro M. Fonteio*, in the year 69, in which he defends the accused in a charge of extortion, by exciting pity for his client, and odium against his accusers; the first part is wanting, and of the rest there is only one MS. at Rome. The 7th, *Pro Lege Manilia*, in 66, delivered before the people in favor of the motion of Manilius that the command of the Mithridatic war should be given to Pompey; this is a famous and beautiful oration. The 8th, *Pro Aulo Cluentio Avito*, in 66, by which he obtained the acquittal of the defendant, who had been accused of poisoning his father-in-law. The 9th, *De Lege Agraria in Servilium Rullum Orationes tres*, in 63; the intention of Cicero was to defeat the plans of Rullus, who wished to sell the public lands for the benefit of the plebeians; this oration is very important, as it treats of the administration of the Roman public lands, but for this very reason it is difficult to understand. The 10th, *Pro C. Rabirio*, delivered before the people; this was a case of murder, and the duumviri chosen had been appointed in an unusual manner; after his sentence the defendant, as was the custom, appealed; this oration treats of prerogatives; Niebuhr has made some discoveries concerning it in the Vatican. The 11th, consisting of four orations, *In Catilinam*, in 63, famous for their eloquence, and historically of great importance, as showing the state of the times; these orations have had innumerable commentators, and are familiar to every Latin scholar. The 12th, *Pro L. Murena*, in 63; he had been accused of using improper means to gain the consulship in opposition to Servius Sulpicius Rufus; this also gives a vivid picture of the times. In this oration Cicero is

very severe against the profession of law, to which Rufus belonged; his remarks must be received with considerable allowance, as it was the custom then, as now, for an orator to attempt to prejudice an audience against his opponent by digressions upon such topics as his profession, and by allusions to various matters foreign to the case in hand; by substituting a vacillating jury for a fickle populace, this case might very well have been argued before a supreme court of the 19th century. The 13th, *Pro C. Cornelio Sulla*, who had been accused of taking a part in Catiline's conspiracy. The 14th, *Pro L. Valerio Flacco*, in 59; he had just returned from Asia, which he had governed as proprætor; he was defended with the greater readiness, as Flaccus was prætor when Cicero was consul in 63. The 15th, *Pro Aulo Licinio Archia*, the teacher of Cicero; his title to the rights of citizenship had been called in question, and Cicero maintains it with consummate skill, fine language, and excellent method; although the genuineness of this oration has been doubted by some, who find in it marks of carelessness and levity. The 16th consists of four orations, *Ad Quirites, In Senatu, Pro Domo sua ad Pontifices, De Haruspicio Responsis*, in 57; these relate to his domestic affairs; their authenticity was called in question by Markland, an English scholar, in 1745, who styles them mere rhetorical exercises; this opinion has been opposed with great eagerness by Ross, Gesner, and Wolf. The 17th, *Pro Cneio Plancio*, in 55; he had been accused of using improper means to obtain the prætorship, and was defended by Cicero, whom he had hospitably received when in exile; this oration was much altered after its delivery. The 18th, *Pro Publio Sestio*, in 56; he had also treated Cicero kindly when in exile, and was a bitter enemy of Clodius. The 19th, *In Vatinius*; this is connected with the last, and is an examination of Vatinius, a witness against Sextius. The 20th, *Pro M. Caelio Rufo*, in 56; he was accused of murder. The 21st, *De Provinciis Consularibus*, in 56. The 22d, *Pro L. Cornelio Balbo*, in 56; his title to the rights of citizenship, presented to him by Pompey, was called in question. The 23d, *In L. Calpurnium Pisonem*, in 55, delivered before the senate; this is a reply to Piso, who, when governor of Macedonia, had been recalled through the influence of Cicero; it is the most severe and bitter of all his orations, displaying the whole political career and secret actions of Piso; the beginning is lost. The 24th, *Pro Tito Annio Milone*, who was accused of the murder of Clodius, delivered in 52, but written down much later; though unsuccessful, this is considered by many one of his best speeches; Cicero, moreover, took a personal interest in the case for political reasons; there is a part of a commentary upon it by Asconius. The 25th, *Pro C. Rubirio Posthumo*, in 54; he was accused of being connected with Gabinus in the mismanagement in Syria; Cicero has been much

blamed for pleading this case. The 26th, *Pro M. Marcello*, in 47, before the senate; this was to obtain the recall of Marcellus from exile, and was the first delivered after Cæsar became the head of the state; it was written down long after it was delivered, yet it is one of his best for its style, language, and method; it had always passed for one of Cicero's best orations until the time of Wolf, who denied that he wrote it at all, and published a pamphlet to prove that it is only a rhetorical performance at the schools; this pamphlet is perhaps one of the best specimens of modern Latin extant; the statement met with many opponents, especially Jacob, who would not give up the opinion of centuries so easily. The 27th, *Pro Q. Ligario*, in 46; he was a partisan of Pompey, and was successfully defended by Cicero against Tubero. The 28th, *Pro Deiotaro*, the tetrarch of Galatia, and the friend of Pompey, who was accused of conspiring to murder Cæsar, in 45; he was defended with success. The 29th, *Orationes quatuordecim in M. Antonium*, sometimes called the "Philippics," in imitation of those of Demosthenes against Philip of Macedon; written between September, 44, and May, 43, and designed to defeat the ambitious schemes of Antony; the second, which is the best, was not delivered; it is a reply to an attack by Antony in the senate. These orations may be considered as the cause of Cicero's murder, as they kindled a flame of vengeance in the breast of Antony which nothing but his blood could extinguish; the language is forcible, pure, and elegant; besides exposing the public and private life of Antony, they afford important materials for the history of that troubled period. These are all the orations of Cicero which we have nearly or quite complete; there are some imperfect ones, of which may be mentioned the *Commentarii*, said to be in 13 books; they were probably notes, which he used when he afterward wrote out his speeches; the loss of these is much to be regretted; *Pro C. Cornelio*; *Pro Toga Candida adversus Competitores*; *Pro M. Emilio Scaurō*; *De L. Othone*, to allay the tumult which had arisen on account of the division of the seats at the theatre. In connection with the orations of Cicero, should be mentioned those by whom new fragments have been discovered; the most celebrated is Angelo Mai, for many years the librarian of the Vatican; others are Peyron and Niebuhr. As an orator, Cicero is without doubt the greatest his country ever produced; even in his own time he was placed by the side of Demosthenes. He exhibits the happy medium between the dryness of Demosthenes and the exuberance of the Asiatic school; no ancient orator could so easily and naturally turn the feelings of an audience in any desired direction. With Cicero Roman eloquence attained its highest excellence, and after him rapidly declined; the condition of the state did not permit its exercise for any but political purposes; it fell into the hands of rhetoricians,

who cultivated it only as tending to strengthen the mental powers; it became a written eloquence, composed in the schools; but this kept up the interest in it for a short time only. Cicero has had hosts of commentators, the oldest and best of whom is Q. Asconius Pedianus, a native of Padua; he wrote commentaries on these orations, A. D. 41, for the use of his sons; the fragments preserved show the great value of this work; they relate to nine orations, and were discovered by Poggio in St. Gall; some others were found in the Ambrosian library at Milan.—Cicero was also chief among the Roman philosophers. He was first an Epicurean, and the disciple of Phædrus; he afterward paid great attention to the Academic philosophy, on account of its excellent system of philosophical and rhetorical education; finally he devoted himself to the Stoic school, yet even this, like the rest of his countrymen, he regarded only as a means of education, and not as a rule of life. He discontinued his philosophical pursuits when he entered upon public duties; but after the downfall of the republic he again devoted himself to these studies, and wrote in rapid succession his works on philosophic subjects. His object was to make his countrymen familiar with the philosophy of Greece; the reader must not, therefore, expect to find in his works anything new. Cicero was for a long time considered authority on matters of philosophy, instead of the Greek originals; but after the revival of learning in the middle ages, more attention was directed to the latter. On abstruse subjects, such as God, the soul, &c., he never expresses himself with certainty, but always speaks in the most guarded manner; he has, therefore, often been censured for opinions that he probably never entertained, as, for instance, atheism. He seems to have written on the Academic principle, “that there is no certain knowledge.” In his manner of treating his subjects he follows Plato, but in his morals he is decidedly a disciple of Zeno the Stoic. His philosophical works, in the order in which they were written, are the following: *De Republica libri sex ad Atticum*, composed at his villa near Cumæ, 54 B. C.; this is a dialogue between Scipio, Lælius, and others, on “What is the best form of a state?” The scene is laid about 129 B. C.; a very interesting time, when the country was convulsed by the disturbances of the Gracchi, whose movements furnish many illustrations in the course of the work; the book closes with the *Somnium Scipionis*. It was lost for several centuries, with the exception of the “Dream of Scipio,” which was saved by means of a commentary upon it by Macrobius; there were a few fragments, too, found in the Christian fathers. Mai discovered a palimpsest, the upper writing of which was a book of the Psalms, and the lower the *De Republica*; similar strange fellowships are not uncommon in the palimpsests; by this most of the first and second books have been recovered. The next work is *De Legibus libri tres*; the genuineness

of this has been questioned from the fact that in another book, *De Divinatione*, Cicero enumerates all his works, and that this is not among them; but this reason is insufficient, as the present book is unfinished, and of course would not have been included in a list of his writings; the second and third books were probably never revised; it was written soon after the death of Clodius, when Cicero was chosen into the college of augurs, in 53; it was not published until after his death; in this work Cicero shows that there is in man a natural principle to make and respect laws; Macrobius quotes a fifth book. The next is *Academica*, a curiosity on account of the changes it has undergone; it was originally written in two books; he afterward rewrote it. It treats of the old academy of Socrates and the new of Carneades and Philo; it also contains a sketch of the system of Arcesilaus, or the middle academy. We have much of the first book of the second edition. It was written in 45, and is perhaps as good a book as any by which to ascertain Cicero's real opinions, always a difficult task. *De Finibus Bonorum et Malorum libri quinque*, addressed to Brutus, was written also in 45; it consists of dialogues containing the views of the most celebrated Greeks on this subject; in the first book Torquatus gives the view of Epicurus, and in the second Cicero refutes it; in the third and fourth Cato and himself state the opinions of the Stoics; and in the fifth Piso gives the views of the old academy. It is very important in literary history. *Tusculanarum Disputationum libri quinque ad Brutum* appeared in 44; it was written with great rapidity, and bears marks of carelessness purposely introduced to give it an air of ease; it consists of dialogues in his own villa upon various practical subjects; the first book is on the contempt of death; the second on firmness and constancy in suffering; the third on the means of alleviating suffering; the fourth on the passions; the fifth on virtue as the means of happiness; the last is by far the best; a good edition is the old English one by Davis. *De Natura Deorum libri tres ad Brutum* was written in April, 44; in this dialogue are expressed the opinions of the Epicureans, Stoics, and Academics on this subject, but as usual it is difficult to get at his own opinions; he seems to agree with Plato and the Academics; his object was to introduce better views on this important subject. *De Divinatione libri duo* was written immediately after the last, and is connected with it; in the first book his brother Quintus states the opinions of the Stoics in favor of divination, and in the second Cicero refutes them. *De Fato* is intimately connected with the preceding two; its intention is to overthrow the Stoic doctrine of fate, and to establish that of free will; it is very imperfect, the first and last portions being lost, and the text of the rest quite unsettled. *De Senectute*, addressed to Atticus, was written in the country; it de-

scribes the peculiarities of old age, and shows that they should be looked upon without uncharitableness, as it is the lot of all who outlive friends and kindred; it is mostly a soliloquy, and so charming that we are almost persuaded to long for old age as the most enviable portion of human life. *De Amicitia*, addressed also to Atticus, was composed soon after; Lælius is the chief character, and gives utterance to the most exalted sentiments. *De Officiis libri tres*, written in 44 to his son Marcus, abounds in noble sentiments, although not quite coming up to the theoretical morality of modern times. *Paradoxa Stoica*, in six books, addressed to Brutus, treats of the dogmas of the Stoics. Cicero wrote several other philosophical works, wholly or nearly lost; he himself alludes to several, as: a Latin paraphrase of the *Timæus* of Plato; *De Gloria libri duo*, addressed to Atticus, of which we have a few fragments; there is a report that Petrarch had a MS. of this work; *Economicorum libri duo*, in imitation of Xenophon, laying down the duties of the master of a family; Columella made some use of this; it was written when he was very young, about 84 B. C.; a translation of the works of Protagoras, a follower of Democritus; *Laus Catonis*, in praise of Cato Uticensis, in 46; this was received with such approbation that Cæsar, fearing its influence, wrote *Anti Cato*, in answer to it; only a few fragments are preserved; *De Philosophia*, in which he recommends the study of philosophy, and defends it against several objections; *Consolatio*, written on the death of his daughter Tullia; *Liber de suis Consiliis*, written in the year of his consulship, 63 B. C.; *Chorographia*, a geographical work. Cicero was also a didactic poet; he translated the *Phænomena* of Aratus, a part of which has come down to us.—There have been many lives of Cicero; there was one written by his freedman Tiro, and one by Nepos, which are lost; we have one by Aurelius Victor, and another by Plutarch, besides many facts and data collected from his own writings, especially his letters. Among modern biographies that of Middleton (London, 1741; Bohn's edition, 1854) has gained much fame; but it is a panegyric of such extravagance as to make a large proportion of its statements untrustworthy. Forsyth's "Life of Cicero" (London, 1864) is an excellent work; and a very good biography of Cicero is to be found in vol. v. of Drumann's *Geschichte Roms*. Mommsen, in his *Römische Geschichte*, handles him very severely. A good English translation of the works of Cicero (with the exception of the "Letters") is published in Bohn's "Classical Library." The "Letters" have been translated by Melmoth and Heberden.

CICOGNA, Emmanuel Antonio, an Italian historian, born in Venice, Jan. 17, 1789, died there, Feb. 22, 1868. He published numerous works relating to the history of Venice, the most important of which is *Delle iscrizioni Veneziane raccolte ed illustrate* (21 parts).

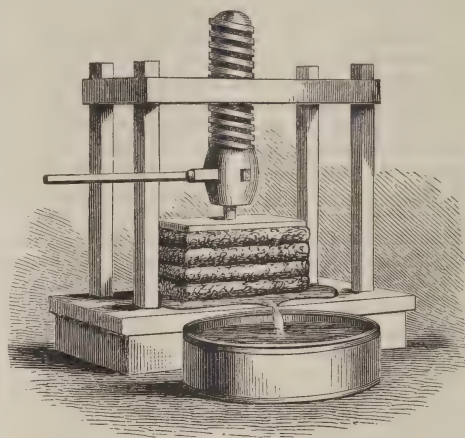
CICUTA, a deadly genus of plants belonging to the natural order *umbellifera*, with dissected leaves, white flowers, and subglobose fruit contracted at the sides. *C. maculata* (water hemlock, spotted cowbane, musquash root, or beaver poison) is common in swamps in the United States. The root, which somewhat resembles a parsnip in taste and smell, has given rise to cases of fatal poisoning. The seeds contain an alkaloid, supposed to be identical with conia. It has been used in the treatment of nervous headaches. Poisoning by it should be treated with emetics and stimulants. A full account of the plant may be found in Bigelow's "Medical Botany," i., 125, and an analysis of its seeds in the "American Journal of Pharmacy," vol. xxvii., p. 294. *C. virosa* (cowbane or water hemlock), the European species, an acid narcotic, produces tetanic convulsions, and has proved fatal to both men and animals. It has little or no use in medicine. (See *CONTUM*.)

CID, The, or *Cid Campeador* (lord champion), a popular hero of Spain, whose real name was RUY or RODRIGO DIAZ, born at the castle of Bivar, near Burgos, about 1040, died at Valencia in 1099. He figures prominently in early Spanish literature, but his genuine exploits are so mixed up with fictions that it is impossible to ascertain his real history. According to the most consistent accounts, he belonged to a powerful family, and became standard-bearer and commander of the royal troops to Sancho II., king of Leon and Castile. At the siege of Zamora the king was treacherously slain, and his brother Alfonso, the next heir to the throne, was suspected of having been privy to the deed. Diaz compelled Alfonso to declare his innocence by an oath, with terrible maledictions in case of falsehood, before he would permit him to occupy the throne. His life was spent in combat with the Moors, to whom he became a terror on account of his constant success. The designation *el Seid*, corrupted to Cid in Spanish, was given to him by the Moors in acknowledgment of his prowess, while the Spaniards whom he protected and avenged called him *el Campeador*, the champion; and finally the two epithets combined were almost universally applied to him. He captured Valencia about five years before his death, and established himself as its ruler. His wife held the place about three years after he died, and was then forced to fly to Castile, where she died in 1104. He had a son, who was killed by the Moors in battle, and two daughters, one of whom was married to the count of Barcelona and the other to the prince of Navarre. The exploits of the Cid soon became the subject of poetry and romance, and he became in the popular mind the pattern of a Christian warrior, invincible in battle and unblemished in character. Fictions were mingled with his actual achievements, until his identity was well nigh lost; and some writers have even contended that he was only a myth. The

"Poem of the Cid," composed about the year 1200, is one of the earliest and most vigorous specimens of Spanish verse. It contains nearly 4,000 lines, and professes to give a continuous account of the doings of its hero. The author is often spoken of as the Homer of Spain, but his name is unknown. The "Chronicle of the Cid," a prose production of the 13th century, is also of unknown origin. There are three editions of this, dated in 1541, 1552, and 1593. Besides these there are numerous romances and ballads on the same subject, many of which have been translated into English by Lockhart. A complete collection in the original is contained in Augustin Duran's *Romancero general*. The old "Poem of the Cid" was originally published by Sanchez in the first volume of his *Poesias castellanas anteriores al siglo XV*. (4 vols. 8vo, Madrid, 1779-'90), and reprinted by Ochoa (8vo, Paris, 1842). Excellent translations from it were made by Herder in German, and by J. Hookham Frere in English. Southey's "Chronicle of the Cid" is made up of free versions and compositions from the old poem, the prose chronicle, the ballads, and the general chronicles of Spain. It furnishes the stories and traditions in a very pleasing form. Of the dramas founded on this romantic subject Corneille's *Cid* is the best known.

CIDER, the expressed juice of apples, either fermented or unfermented. Its quality depends upon that of the fruit from which it is made. Vinous fermentation converts the sugar contained in the juice into alcohol. The specific gravity, therefore, of new or unfermented cider, being very nearly in proportion to the amount of sugar, will indicate to the manufacturer the strength which he may be able to give to his cider. The apples should be ripe and well mellowed, to diminish the quantity of gum, and develop the greatest possible quantity of sugar as well as the highest flavor; and they should also be well crushed, that the

turned on vertical axes by a horizontal lever, and firmly supported upon a vat into which the pulp falls. The pressing may be conveniently performed by a common screw press, in which

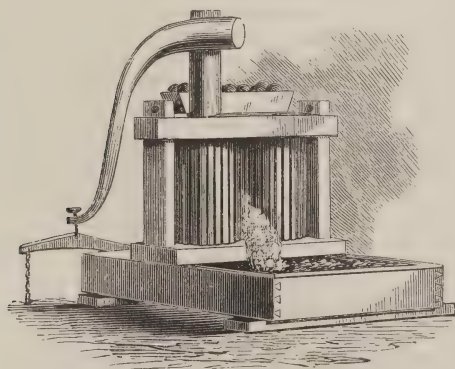


Cider Press.

the pulp is placed in layers called cheeses, folded in straw. The juice is received in a tub or vat, and is carefully strained before being put in barrels. The fermentation of cider is conducted in the same manner as that of wine, and several varieties may be produced from different apples, and by various methods. It may be kept in barrels or bottles, like wine. The new or sweet cider is sometimes boiled to a thin sirup, which may be preserved in tight bottles for a long time, and conveniently used for preserving, and for preparing condiments and other articles of food.

CIENFUEGOS, a city of Cuba, capital of a jurisdiction in the department of the Centre, situated on the S. side of the island, on the bay of Jagua, 130 m. S. E. of Havana; lat. 22° 15' N., lon. 80° 32' W.; pop. about 10,000. The harbor, which is capacious and safe, is defended by the fort of Los Angeles. The city is the most beautiful on the island. The streets are wide and straight, and many of the houses are surrounded by gardens. Among the principal buildings are a theatre, a number of churches, and several public schools. Railways connect the town with Cardenas and Sagua la Grande, on the N. coast. It has two daily newspapers and a considerable local trade. The chief exports are sugar, wax, and timber. Cienfuegos was founded about 1813, and was named from the captain general of Cuba at that time.

CIENFUEGOS, Nicasio Alvarez de, a Spanish poet and dramatist, born in Madrid, Dec. 14, 1764, died at Orthez, France, in July, 1809. He was educated at Salamanca, and in 1798 published a volume of miscellaneous poems. He also wrote pieces for the stage, successful in their day, but now neglected, including *Pitaco*, *Idomeneo*, *La condesa de Castilla*, and *Zoraida*. He became the editor of the government gazette



Cider Mill.

pulp may be immediately put to press, before fermentation commences. A good form of mill, which has long been in use, consists of two longitudinally grooved wooden cylinders

in 1798; and on the occupation of Madrid by the French in 1808 he so offended Murat that he was condemned to death for trying to incite an insurrection. The sentence was commuted to banishment to France, but he survived only a few days after reaching the place of his imprisonment.

CIEZA, a town of Spain, on the Segura, in the province and 24 m. N. W. of Murcia; pop. about 8,000. It has a workhouse, a public granary, and manufactures of coarse linen.

CIGAR (Span. *cigarro*), a cylindrical roll of tobacco for smoking, usually pointed at one end and truncated at the other, made of the leaf divested of stems and enveloped tightly in a single leaf. A diminutive cigar (*cigarrito*) is made of chopped tobacco wrapped in unsized paper. In the East Indies a cigar called cheroot is made, having the form of the frustum of a slender cone. The best tobacco for making cigars grows in the western end of the island of Cuba, and is known as the *vuelta abajo*, the plant most in vogue there being the *nicotium repanda*. That which is raised east of Havana is called *vuelta arriba*, and is of an inferior quality. The most noted *vega* or plantation is situated near the town of Santiago de Cuba, and is called Yara. The *vuelta abajo* is divided into five classes: 1, *calidad* or *libra*, noted for its good color, flavor, elasticity, and perfection of the leaves, rendering it desirable for wrappers; 2, *ynjuriado principal*, or firsts, which has less flavor and is usually of a lighter color; this also is suitable for wrappers; 3, *segundas*, or seconds, a shade poorer in every particular, but good for fillings and inferior wrappers; 4, *terceras*, or thirds, which are generally employed for fillings; 5, *cuartas*, or fourths, also employed for fillings. The choicest tobacco is that raised on the banks of the rivers which are periodically overflowed. The varieties are called *Lo Rio*, *Rio Hondo*, and *Pinar del Rio*, and the tobacco is distinguished from all others by a fine sand which is found in the creases of the leaves. The island of Trinidad also produces a very superior article of the same sort. In Mexico a large quantity is raised, but entirely for home consumption, its exportation being forbidden. The tobacco used for manufacturing the Manila cheroots is the produce of the island of Luzon, and is considered nearly equal to that of Cuba. A very superior quality is also raised in the province of Kadoe in Java, in a naturally rich soil, alternately with crops of rice, and without manure. In western Asia, that produced at Latakiah in Syria, and that of Shiraz in Persia, are most highly prized. In the province of Gelderland, Holland, about 2,000,000 lbs. are produced, the larger portion of which is purchased by the French government. In Connecticut also a very superior article for the exterior wrapper is grown, and much of it shipped to Cuba, the remainder being employed mostly in New York for the same purpose. These peculiar varieties are valuable on account of the fineness

of the leaf and its freedom from thick fibres. Many experiments have been made in transplanting the seed of the Spanish tobacco to various parts of the world, particularly to the middle states of the American Union, and in some cases with marked success. It has been found necessary, however, to renew the seed every two years, as after that period the plant loses its original odor and flavor.—Although cigars are of very ancient origin in the West Indies, they were not generally known in Europe until the beginning of the 19th century. In fact, of all the various works on gastronomy and the pleasures of the table, written and published from 1800 to 1815, not one speaks of this adjunct of a good dinner. Even Brillat-Savarin, in his *Physiologie du goût*, entirely ignores tobacco and all its distractions and charms.—As the best tobacco grows in Cuba, so also the best cigars are made there. Previous to 1820 the manufacture was a government monopoly, and since that period the trade has been open; but so great is the demand that very little competition exists among the manufacturers. The brands affixed to Havana cigars are entirely arbitrary, and are rarely continued for any great length of time. In the Philippines, the tobacco and its manufacture are a close government monopoly. The best quality is produced in the northern parts of the island of Luzon. It is raised under the supervision of government officials, and is taken from the growers directly, a liberal price being paid for it. That produced in the southern group known as the Visayas is of an inferior quality, and is sold to merchants holding a permit "to purchase at the shipping ports, and transport to Manila for sale to the government." The Luzon tobacco is classed and paid for by the government at the ports whence it is shipped to Manila; but the merchants buying in the southern islands transport it to Manila at their own risk, and then take the chances of its being classified much lower than they have purchased it. Being under heavy bonds to deliver all they purchase at the government storehouses, but little smuggling is carried on, the risk being greater than the gain. There are three factories for manufacturing cigars—one in Manila, where 7,000 females and 1,200 males are employed; one in Cavité, in which 5,000 operatives, mostly females, are engaged; and one in Malabon, which gives employment to about 2,000 more, also females. These operatives are paid by the piece. It is supposed by many, in consequence of the soporific effect produced by using cheroots, that opium is employed in preparing the tobacco in these factories, which is an error, no admixture of any kind being permitted. A very large amount of tobacco of an inferior quality is consumed on the islands, the better kinds being generally exported.—In every large city throughout the United States immense numbers of persons are engaged in this manufacture. Great skill has been attained in the American factories in ma-

king cigars; so much so that it is difficult to discriminate between the genuine and the spurious article, excepting by trial, and even then in some cases it requires the nicest taste to detect the difference. Many persons engaged in this business import tobacco from Cuba, employ the Connecticut leaf for wrappers, and produce an article equal in appearance to the very best made in Havana. In Bremen and Hamburg immense numbers of cigars are made, and shipped to every point of the habitable globe at very low prices. The city of Bremen, which was among the first to adopt this branch of industry, has now become one of the first markets in the world for the sale of cigars. In Spain, the manufactories at Seville have attained a high European reputation, and, being protected by government, very nearly monopolize the trade. The employment of female labor in the manipulation of this article is one of its noticeable features; and it is work particularly adapted to women, requiring great dexterity and peculiar delicacy in the handling.—The consumption of cigars extends all over the globe, and increases yearly in a wonderful ratio. The number of cigars exported from Havana in 1872 was 229,087,545; of cigarettes, 19,344,707. In 1873, to April 18, the numbers were 78,655,231 and 5,501,769 respectively. The annual home consumption of cigars in Cuba was estimated some years ago, in a consular report, at nearly 1,500,000,000.

CIGNANI, Carlo, an Italian painter, born in Bologna in 1628, died at Forlì, Sept. 6, 1719. He was a pupil of Albano, and passed a number of years at Rome, Florence, and Parma, studying the works of Raphael and Correggio. On the establishment of the Clementine academy by Pope Clement XI. in 1708, he was appointed the director. Among his principal works are the "Assumption of the Virgin," an immense fresco in the dome of a church at Forlì, which occupied him 20 years; the "Entry of Pope Paul III. into Bologna," "Francis I. healing the Lepers," the "Nativity," the "Virgin and Infant enthroned," four subjects from sacred history in ovals, supported by angels (all at Bologna), "Charity," and the "Chastity of Joseph."

CIGNAROLI, Giovanni Bettino, an Italian painter, born near Verona in 1706, died in 1772. His best works are in the cathedrals of Pisa, Bergamo, Mantua, and in the churches of his native city and of Ferrara. Chief among them are the "Flight into Egypt," the "Holy Trinity," the "Descent from the Cross," the "Transfiguration," and the "Death of St. Joseph," in style modelled on the works of Correggio and Guido. He wrote with taste on various subjects.

CILIA (Lat. *cilium*, an eyelash), minute, hair-like, constantly moving organs on the surface of animal and vegetable tissues. They are abundantly found in all the individuals belonging to the class of microscopical animalcules, the most minute and the lowest in

organization of all created beings. Examined by the microscope, these remarkably delicate organs are seen to be in incessant vibratory action, and hence they are usually described as vibratile cilia. In this lowly class of animals the cilia appear to perform three very important functions: 1, their vibration causes a vortex in the water, by means of which particles of food in the phytivorous species, and smaller animalcules in the carnivorous tribes, are brought unresisting to the mouth; thus are they the fruitful agents for procuring food; 2, they constitute the sole organs of locomotion; and 3, they are the respiratory organs. In consequence of the general minuteness of animalcules, it is very difficult to discern the precise kind of motion incidental to the vibratile cilia; the superior size, however, of the members of the class *rotifera* has left nothing to be regretted on this account. If the water containing specimens of the common wheel animalcule (*rotifer vulgaris*) be slightly poisoned, sufficiently to interfere with their respiration, the cilia will be seen to move so very slowly that their precise action may be readily perceived. It will then be seen that the down stroke is a very rapid one—so rapid that, in a healthy vigorous state, it cannot be seen, the up strokes being alone visible; and placed on a rounded tubercle, as they are in *R. vulgaris*, their combined action gives the appearance of a wheel revolving, and hence the common name of the class; the up stroke is singularly slow. Striking the arm down quickly, and drawing it back slowly, is the best approximation to the true action of the vibratile cilia.—The excellence of modern microscopes, and the improved methods of conducting the examination of difficult objects, have thrown a new light on this interesting subject. We now know that these remarkable organs are not restricted to the animal kingdom, but are extensively developed in the lower plants, where they appear to perform two of the functions witnessed in the animalcules, viz., locomotion and respiration. They are extensively developed in the common but beautiful fresh-water alga, *volvox globata*, in all the species of *conferva*, *closteria*, &c. In all these locomotive plants, by the application and careful management of the achromatic illuminator, the cilia while the plants are in motion become distinctly visible, but they are no longer to be seen when the plant is at rest.—Passing from the lowest to the higher grades of animal life, even among vertebrates vibratile cilia are constantly found, but differing in their mode of arrangement. In animalcules these delicate hair-like processes appear to be attached directly to the tissues of which they form a part, but in mollusks we find the unmistakable evidence of the development of epithelium as the protecting medium of certain organs. Thus the oyster, mussel (*mytilus edulis*), and all the bivalves, whether of the fresh waters or marine, have their respiratory organs, the gills, covered

with epithelium, and in this particular situation it is always ciliated. So far as is at present known, these organs are constantly to be found in connection with the respiratory function; but in animals as high as the vertebrates, especially the mammalia and man, they are found associated with other functions. The epithelium which coats the base of the frog's tongue is ciliated, and if removed swims freely through a film of water by this agency; in the batrachians, however, it is highly probable that the tongue is an important organ, adjunctive to respiration, and to these organs vibratile cilia belong through all the classes from animalcules up to man. In the warm-blooded mammalia and in man, these organs are found in connection with the epithelium covering the mucous membrane of the trachea, and throughout the distribution of the bronchi; so far they are respiratory. They are also found on the epithelium of the ear, the nose, and of the Fallopian tubes. The most remarkable part of their history remains to be told: they have been seen in active vibration many hours after death in cats, dogs, rabbits, pigeons, &c. In man there has been no diminished action apparent 60 hours after death, and in a tortoise they have been observed in rapid motion three weeks after death, when all the rest of the body was in a putrid condition. It must be quite apparent, therefore, that they possess and maintain motion altogether irrespective of vitality, for they continue to move energetically when all around them is not only dead, but decomposing; and from this latter fact it should appear that their true place is among the vegetative organs of the body. The exact phenomena of their motion are yet to be discovered. (See ANIMALCULES.)

CILICIA, an ancient division of Asia Minor, lying between lat. 36° and 38° N., lon. 32° and 37° E., bounded W. by Pamphylia, N. by Isauria, Lycaonia, and Cappadocia, from which it was divided by the Taurus, E. by Syria, from which it was separated by the Amanus mountains, and S. by the gulf of Issus and the Mediterranean sea. The W. portion, from its mountainous character, was called Tracheia (rough), and the E. portion, composed in great part of plains, Pedias (level). It is a strip of land extending about 300 m. along the shore from W. to E., with a width from N. to S. rarely exceeding 50 and never 70 m., and sloping from the summit of the Taurus mountains toward the sea. The coast of Cilicia Tracheia is abrupt, and a short distance inland there is a mountain ridge. Between this and the Taurus lies the basin of the Calycadnus river (now the Gok Su), which flows E. S. E. to the sea, and with its branches drains a large district. Cilicia Pedias is a fertile and well watered region, producing trees, vines, and such grains as millet, sesame, wheat, and barley. It is crossed by three large streams: the Cydnus (now Tersus Tehai) which rises in the Taurus mountains and flows S.; the Sarus (now Si-

hun), which comes through the gorges of the mountains from Cappadocia; and the Pyramus (now Jihun), which also crosses the northern barrier, and flows S. W. The water of all these streams is very cold, and the current in some parts rapid. The Cydnus was the scene of a cold bath which nearly killed Alexander the Great, and of the first interview between Antony and Cleopatra.—Cilicia is supposed to have been settled by Phœnicians, and the people were distinguished in early times for commercial and maritime enterprise. Though tributary to the Persian empire, the country was in the time of Darius and Xerxes subject to a race of native princes named Syennesis. Cyrus the Younger crossed Cilicia in his expedition against his brother. The Greeks colonized the country in the time of Alexander, after whose death it was made a part of the Syrian empire, and Tarsus afterward became one of the great centres of learning in the East. In the 1st century B. C. pirates swarmed from the coast of Cilicia, and in subduing them through Pompey the Romans acquired the whole country. When Cicero was proconsul the province included also Pamphylia, Pisidia, Isauria, Lycaonia, and the island of Cyprus. Native princes still held out in the mountains until the time of Vespasian. Under Augustus Cilicia was an imperial province, and contained six free cities, Tarsus, Anazarbus or Cæsarea, Corycus, Mopsus, Seleucia, and Ægæ. It now forms the Turkish vilayet of Adana.

CILLY, or *Cilli* (anc. *Celeia*; Slovenish, *Celje*), a town of Austria, in the crown land of Styria, capital of an extensive circle, situated near the junction of the Ködenbach with the San, 36 m. E. N. E. of Laibach; pop. in 1870, 4,203. It is an old town, surrounded by walls and towers, and contains a quaint parish church, having a fine altar and a side chapel with a Gothic throne and ciborium of carved stone. There are ruins of an ancient castle, long the residence of the counts of Cilly, and of the Lazarist convent of St. Joseph, with two towers. Remains of Roman architecture have also been found here. The castle, Neu Cilly, is 4 m. outside of the town. The principal trade is in wine, cereals, cattle, and coal. There are in the vicinity extensive coal fields and deposits of spathic and hæmatite iron ore; an English company was established in 1867 for manufacturing steel and iron.—The site of Cilly has been identified with that of Celeia or Caleia, a city at the S. E. extremity of Noricum, and with the Roman colony of Caleia Claudia, which grew out of the ruins of the more ancient city. During the middle ages it was the capital of the Slavonian district of Zellia. It was ruled by Austrian dukes from 1146 to 1331, and in 1339 it became the capital of the newly created county of Cilly. The assassination of Count Ulric at Belgrade in 1456 putting an end to that line, it has since been Austrian.

CIMABUE, Giovanni, called the "father of modern painting," born at Florence in 1240,

died about 1302. He was of noble birth, and while a pupil in the school of the convent of Santa Maria Novella manifested such an aptitude for painting that his parents allowed him to receive instructions, according to Vasari, from some Greek artists who were then restoring the old paintings in the convent chapel. According to others, Giunta Pisano, an artist of considerable merit, was his instructor; and as Guido da Siena is known to have painted as early as 1221, Cimabue's claim to the distinction which tradition and the zeal of his countryman Vasari have conferred upon him is by no means free from doubt. His models, however, were clearly Byzantine, and his earlier works are strongly marked by the characteristics of that school. His great merit consists in his efforts to break away from the formal monotony of his Greek models. The earliest of his works, a St. Cecilia, is still preserved in the church of San Stefano, and a large portion of the frescoes in the celebrated church of St. Francis in Assisi, commenced by Greek painters and continued by Giunta Pisano, are by his hand. Besides these, almost every great European collection contains a specimen of him. In the prime of life he painted his chief work, a colossal madonna and child, for the church of Santa Maria Novella, where it now hangs. The legend states that the Florentine populace testified their wonder and delight at this novel creation of art by carrying it in a triumphal procession to the church. Cimabue's fame thenceforth spread over Italy, and he established a school of painting, in which his ideas received a new development. He evinced a generous appreciation of Giotto, whom tradition says he discovered drawing figures upon the smooth surface of a rock while tending his sheep, and whom he took with him to Florence, and instructed to such purpose that the pupil soon outstripped his master. Cimabue improved little upon the Byzantines in his madonnas, but his patriarchs and apostles have a grand and impressive character. He is described as haughty and disdainful, and exceedingly proud of his lineage, as well as of his acquirements in literature and art.

CIMAROSA, Domenico, an Italian composer, born at Aversa about 1750, died in Venice, Jan. 11, 1801. He studied music under Fenaroli, a pupil of Durante, and soon became so celebrated for his operas composed for the Italian theatres that in 1787 Catharine II. of Russia invited him to become dramatic composer to her court. In 1791 he became director of the Italian opera at Vienna. Here in 1792 he composed *Il matrimonio segreto*, esteemed his greatest opera, which was received throughout Europe with enthusiasm. A peculiarity of it is that brass instruments are excluded from the orchestra, and the other wind instruments are very sparingly used. The accompaniments, nevertheless, are of a rich and brilliant character. The career of Cimarosa in Vienna was cut short by the death of the emperor Leopold

II. in 1792, after which he returned to Naples, where he produced some of his finest works, including *Il matrimonio per susurro*, *La Penelope*, *L'Olimpiade*, *Il sacrificio d'Abramo*, *Gli amanti comici*, and *Gli Orazi*. During the French occupation of Naples in 1799, Cimarosa avowed himself so openly in favor of revolutionary doctrines that upon the return of the Bourbons he was thrown into prison, where he languished in close confinement for many months. Released in 1800 on condition that he would quit the Neapolitan territory, he repaired to Venice, where he died the following year, in consequence, it is said, of the treatment to which he had been subjected. During his residence in Venice he brought out his opera *L'Imprudente fortunato*, and had partly composed another called *Artemisia* at the time of his death. Among his works are 69 operas, 4 oratorios, 3 cantatas, 2 requiems, and a mass, besides much miscellaneous sacred music, and 500 detached pieces composed during his residence at St. Petersburg.

CIMBRI, a warlike people of antiquity, who first appear in the history of the Romans in the year 118 B. C. Together with the Teutons they left their abodes in N. W. Germany with their families, wagons, and cattle, in great numbers, attacked their western neighbors, were repulsed, and, turning their arms southward, crossed the eastern Alps and entered Illyricum, then recently made a Roman province. Their original abode is not known. Some of the later historians suppose them to be Germans, like the Teutons, and inhabitants of the shores of the North sea; so Cæsar, Tacitus, and Pliny, who gave the name of Chersonesus Cimbrica to modern Jutland. Others, like Sallust, suppose them to be Gauls; Greek writers connect their name and history with those of the Scythian Cimmerii of the Crimean peninsula; some modern critics regard them as Celts and relatives of the Cymry of Britain. The consul Papirius Carbo first met them in the field near Noreia, in Styria, when the valor of the huge barbarians and their numbers overwhelmed the Romans, and their devastations spread terror all around. They could have easily penetrated into Italy, but choosing to take their course westward, they passed over the Rhine and pillaged Gaul. Another consular army sent thither was also routed in 109; but their offer of alliance and request for lands were rejected by the Romans. Their new allies, the Helvetians, defeated the consul Longinus, who fell in the battle, while his legate was routed by the chief body of the invaders. They next moved in the direction of Italy, crowds of Gauls joining them, and near the Rhône two other consular armies were defeated and their camps taken. The way to Italy was open; terror reigned in Rome. It then happened, for the first time in that city, that no candidate for the consulship appeared. But the Cimbri happily chose another way, passed the Pyrenees, and plundered Spain for a couple of years;

and before they returned the victor of Jugurtha, Marius, who was regarded as the last hope of Rome, and had been three times successively elected consul, formed an army, with which he advanced into Gaul to meet the approaching Teutons, while the other consul, Catulus, opposed the Cimbri, who separately passed the Alps and awaited their allies in the valleys of Italy. In 102, in a battle which lasted several days at Aquæ Sextiæ (Aix in Provence), Marius routed the Teutons, and their allies the Ambrones, with immense slaughter, and hastened to the aid of his less successful colleague in Italy. The terrible Cimbri had passed the Rætian Alps, gliding down, it was said, on their shields, had turned the course of the Adige to pass its valley more easily, and compelled the legions of Catulus to retreat. In 101 Marius fought a battle on the Raudian fields, near Vercelli. The battle array of the barbarians formed an immense square, covered with their shields, linked together with chains; they were armed with helmets, cuirasses, and spears, and had 15,000 horse; their attack was formidable. But the heat of Italy, the sun and the dust, and the tactics of the Romans, led by Marius, Catulus, and Sulla, overcame them; they were not only defeated, but exterminated: 140,000 men were killed. Still their women fiercely defended their wagons and carts, which formed a kind of fortification. When further resistance became impossible, they killed their children, and then themselves. Some slight remnants of the Cimbric nation reappear afterward, mentioned by Caesar as inhabiting Belgium, and by Tacitus, who speaks of a Cimbric embassy to Augustus from what is now called Jutland, who in their address to the emperor referred to the wars their ancestors had made on the Romans.

CIMICIFUGA (bugbane; Lat. *cimeæ*, bug, and *fugare*, to drive away), a tall herb of the order *ranunculaceæ*, with incisely toothed leaflets and white flowers. *C. racemosa* (black snakeroot) is found from Maine to Michigan and southward. The root is used medicinally in the substance and in the form of decoction, tincture, and extract. A pint of the decoction may be taken daily, but the tincture and extract should be given in the dose of about half a teaspoonful. In small doses it stimulates the secretion of the mucous membrane, and allays nervous irritability. In large doses it is said to produce vertigo, dimness of vision, and depression of pulse. It has been used with apparent success in chorea, rheumatism, and chronic bronchitis.

CIMMERII, a nomadic race of extreme antiquity, concerning whom there are numerous theories of more or less plausibility, but nothing has been established that seems even to approach to certainty or truth. From the slight descriptions that remain of their habits it may be inferred that they were Tartars. They lived in tents, used wagons, and were "milkers of mares." Modern criticism is nevertheless inclined to connect them with the Celtic race.

(See GOMER.) They appear in a mythical form in the Odyssey, as dwellers beyond the ocean-stream, plunged in eternal darkness. The historical Cimmericians seem to have been first known or heard of in Asia Minor and on the shores of the Black sea, where the strait of Yenikale, between the Asiatic mainland and the Tauric Chersonese, or Crimea, was early designated as the Cimmerician Bosphorus. According to Herodotus, they were driven from their abodes in the Crimea by the Scythians, entered Asia Minor by migrating along the shores of the Euxine to the eastward, ravaged it during the reign of Ardys, the successor of Gyges, king of Lydia, and either remained there until the times of Alyattes and Cyaxares (616 B. C.), when they were finally expelled, or were succeeded by a second horde at that period, when both were driven out together.

CIMON, an Athenian general and statesman, born about 510 B. C., died in 449. He was the son of Miltiades, and his mother was Hegesipyle, the daughter of Olorus, a Thracian king. He is said to have married his half sister Elpinice, but as there is no other instance of such a marriage in Athenian history, the truth of this assertion has been doubted. Diodorus says that on the death of his father, in order to obtain the paternal corpse for burial, he took his father's place in prison as guarantee for the payment of a fine of 50 talents inflicted on Miltiades; but other authorities say that the imprisonment was compulsory, as the debt descended to the heir by the Athenian law. According to Cornelius Nepos, he obtained his liberation by the aid of Callias, a man of low birth but of great wealth, who desired to marry Elpinice, and offered to pay the debt of Cimon if the latter would put her away and consent to her nuptials with himself. Cimon at first rejected these proposals, but afterward yielded to the pressing entreaties of his sister. At the battle of Salamis (480) he distinguished himself, and attracted the regard of Aristides, who recognized in the son of Miltiades natural and adventitious advantages which might redound to the future benefit of the conservative party of Athens, and counterbalance the influence of Themistocles. In 477 Cimon and Aristides were placed at the head of the Athenian contingent to the Greek naval armament, under the supreme command of Pausanias, the Spartan regent. They so ingratiated themselves with the confederate Greeks, that on the disgrace of Pausanias the supreme command was transferred to them, and the hegemony of Greece passed thereby from Sparta to Athens. Cimon's first use of his newly acquired power was to destroy the Persian garrison of Eion at the mouth of the Strymon, to capture Amphipolis, and to open that whole country to Athenian colonization. In 476 Cimon expelled the Dolopian pirates from the island of Scyros, and planted an Athenian colony in their place. His next feat of arms was to reduce Carystus, a city of Eubœa, and the

island of Naxos. These victories gave him great influence in Athenian politics, which he threw into the scale of the aristocratic or conservative party, of which Aristides was the head. He contributed to the banishment of Themistocles, the leader of the opposite party. In 466 he won two decisive land and sea battles over the Persians at the mouth of the Eurymedon, on the S. coast of Asia Minor, when 200 Persian ships, out of 350, were captured. Before night-fall he defeated a reinforcement of 80 Phœnician ships. According to Plutarch, these victories were followed by a treaty of peace, concluded by the Persians on the most humiliating conditions; but the historian Callisthenes disputes the statement. Thucydides is silent upon the subject, and some modern historians deny it altogether. These successes and the death of Aristides left Cimon without a rival at Athens. Thasos revolted in 465, and was reduced to obedience by Cimon two years afterward. Two events occurred about this time which brought about the temporary downfall of Cimon. The Athenian colonists on the Strymon and the Chersonese were destroyed by the Macedonians and the Thracians. Cimon was brought to trial for not avenging this injury after the subjection of Thasos; he was accused of having accepted bribes from Alexander, king of Macedon. Pericles was one of the prosecutors, but Cimon was acquitted. While these events were occurring, an insurrection of helots took place at Sparta. Cimon, who admired the Spartans, persuaded the Athenians to send an army to the aid of their rivals. The Spartans insultingly dismissed the aid so generously offered, and the resentment of the Athenians naturally recoiled upon Cimon, who stood responsible for the original movement. His ruin was completed by his opposition to the democratic party on the question of curtailing the power and jurisdiction of the areopagus. Upon the victory of the popular party, under the lead of Pericles and Ephialtes, Cimon was ostracized about 459. In 457 a Lacedæmonian army, posted at Tanagra, threatened Attica. It professed friendly feelings toward the aristocratical party of Athens, and hostility only to the then dominant democracy. Cimon, though an exile, begged to be allowed to fight in his tribe in defence of his country; the Athenians, suspicious of treachery, refused permission. Cimon then besought his friends and retainers, as they valued his character, to do their duty. These friends carried his panoply to the field of Tanagra, and fell around it to the last man; the Athenians were utterly defeated. About 454, after five years of exile, he was recalled at the instance of his great antagonist, Pericles. He was employed in effecting the five years' truce with Sparta, in 450. The next year he was intrusted with an expedition of 200 ships to avenge on the Persian empire the disasters the Athenians had lately suffered in Egypt. While besieging Citium, a town on the S. coast of

Cyprus, he fell a victim either to disease or a wound. His lieutenants, while carrying his remains back to Athens, fell in with and defeated a fleet of Cilician and Phœnician galleys, and at the same time beat the Cyprians on land. Cimon was buried in Athens, and his tomb was visible there in the time of Plutarch (A. D. 100). In his private life Cimon is spoken of by the ancients as the type of generosity, frankness, and affability. After the recovery of his patrimony, he kept a free table for all citizens of his district. He distributed alms in public with prodigality. At his own expense he laid the foundation of the long walls which joined the Piræus to the city. He beautified his private grounds, and threw them open to the public, who were allowed to pluck the fruit and flowers. He bequeathed to the Athenians a pleasure ground in the Ceramicus, which afterward became the seat of the famous academy of Plato.

CINALOA. See SINALOA.

CINCHONA, Peruvian or Jesuits' bark, named in honor of the countess of Chinchon, the wife of the viceroy of Peru, who, having been herself cured thereby, is said to have first carried the bark to Europe, where she used it successfully in the cure of intermittent fever about 1640. Soon after its introduction into Spain, the Jesuits began to receive it from their brethren in Peru, and through them it was spread over Europe, in consequence of which it was called Jesuits' bark. It is the dried bark of many species of the genus *cinchona*, a tree belonging to the order *rubiaceæ* and suborder *cinchonaceæ*. Until very recently it has been impossible to determine with accuracy from which species of *cinchona* the different varieties of bark were obtained, but late investigations with the aid of chemistry have thrown much light upon this subject, though something yet remains to be learned. Although each species or even variety of *cinchona* may be supposed to produce a separate kind of bark, and although these varieties run into each other in such a way that hardly any two botanists agree as to the proper lines of separation, yet the commercial products may be divided into three classes, yellow, red, and gray barks. To these may be added the non-official or Carthagena barks, brought from the northern Atlantic ports of South America. The three varieties first mentioned are obtained from Pacific and South Atlantic ports. The source of the yellow bark is said by the "United States Dispensatory" to be *C. calisaya*, one of the largest and finest species, growing in Peru and Bolivia. A variety of this species, *C. Josephiana*, is but little more than a shrub. The bark of *C. Boliviana*, and the better pieces of *C. ovata*, *C. scrobiculata*, and *C. micrantha*, are probably often mixed with the parcels of *calisaya* bark. The first mentioned species is by some botanists regarded as a variety of *C. calisaya*. The red bark is derived from *C. succirubra*, a large tree, growing upon the western slopes of Chim-

borazo and the neighborhood. *C. nitida* is also indicated by Weddell as a source of this variety. The pale or gray barks are referred to *C. Condaminea* and *C. micrantha* by the "United States Dispensatory," but other species (*C. ovata*, *scrobiculata*, *macrocalyx*, and *uritunga*) probably contribute to the supply. The Carthagenan barks are probably derived partly from some of the same species with the kinds just mentioned, and partly from *C. cordifolia*, *C. lancifolia*, and *C. Pitayensis*. Some of them are of very good quality, and are extensively used for the extraction of the alkaloids. The "false" barks are derived from inferior species of cinchona and allied genera.—The cinchonas appear to thrive best in regions subject neither to extreme heat nor extreme cold, where a somewhat even temperature prevails throughout the year, and where they are partially protected by their neighbors from the direct rays of the sun. These conditions are fulfilled upon the slopes of the Andes between



Cinchona calisaya.

lat. 19° S. and 10° N. For more than a century after Peruvian bark came into use, it was supposed to exist only in Loxa in the ancient kingdom of Quito, and in a few neighboring localities; but in the year 1753 it was discovered in various other places of a corresponding elevation with Loxa above the sea. Little advantage, however, resulted from this; but some 20 years later, under the patronage of the Spanish government, researches were made in New Granada, which resulted in the discovery of several species of cinchona. At a subsequent period supplies of the bark were obtained from other sources, which are now shipped from many of the South American ports, including some ports in the Caribbean sea. Considerable care and experience are necessary in collecting the barks, to select those most valuable, and to know the proper age at which a branch should be decorticated. The bark is collected between May and November. The tree is usually cut down and

then stripped, which is the most economical plan, as fresh shoots spring up from the old roots. But the Indians, to save themselves the trouble, often strip the bark entirely from the tree while it is standing, thus destroying it altogether. Owing to the reckless manner in which the bark has been collected, and the entire absence of any efficient protection to the forests on the part of the government or provision for the cultivation of the trees in plantations, the danger of a serious diminution in the supply of this valuable drug is by no means a remote one. For many years all the large trees of valuable species have disappeared from easily accessible regions. Dr. Weddell in 1847, in order to see the *C. calisaya* in its full vigor, was obliged to make long journeys on foot through the forests, and endure the hardships and privations of the poor *cascañeros* or bark collectors. The Dutch and British governments have made successful attempts to introduce the cinchona into their East India possessions, in Java, and various parts of Hindostan, where the mountainous regions furnish the necessary temperature and moisture for their growth. It has been found that the yield of some species of cinchona in alkaloids may be much increased by covering the bark with moss, and also that a longitudinal strip of bark may each year be taken from a tree without destroying it; the decorticated portion renewing, if "mossed," its former covering, at least as rich in alkaloids as before. Bark from the English plantations has already been introduced into commerce. More or less successful attempts at cinchona culture have been made in Jamaica, the isle of Réunion, Guadeloupe, Brazil, the Azores, and Algeria. It is possible that situations may be found within the limits of the United States suitable for the culture of the cinchonas. The division of the bark into flat and quilled is determined simply by the part of the tree from which it is taken, whether trunk or branches, and the method of drying it, whether under pressure or allowed to roll up.—The medicinal value of Peruvian bark depends upon the alkaloids which it contains. These are quinia, cinchonina, quinidia, cinchonidia, quinicina, and cinchonina. Another alkaloid called cinchine is found in small quantity in some of the inferior varieties. It is probable that the three latter alkaloids are artificial derivatives from the former. In addition to these, the bark contains in varying proportions gum, starch, lignine oil, yellow coloring matter, insoluble red coloring matter, soluble red coloring matter or cincho tannic acid, kinic and kinovic acids. The various alkaloids are produced in the bark itself, and that probably by a reaction between the ammonia, which (according to De Vry) is everywhere contained in the plant, and the cincho-tannic acid. The general condition of the alkaloids is that of being more pure and easily separated from adventitious substances in the bark of the branches, somewhat less so in that of the

trunk, and of all most impure in that of the roots. Quinia, the most important of the alkaloids, has the formula $C_{40}H_{24}N_2O_4$, is crystallizable, slightly soluble in hot and cold water, and very soluble in alcohol, ether, and chloroform. It forms crystallizable salts with several acids. It may be precipitated as a hydrate from a solution of a salt by an alkali or alkaline earth. Ammonia in excess redissolves the precipitate. Sulphate of quinia, or more properly the disulphate, is the medicine commonly known as quinine. It consists of one equivalent of sulphuric acid, 40, two of quinine, 324, and 8 of water, $72=436$. It is in fine, white, silky crystals, which on exposure to the air effloresce and lose their form together with their water of crystallization. It dissolves in 30 parts of boiling water, but separates on cooling. In ether it is slightly soluble. Alcohol when cold takes up one part in 60, and the diluted acids, tartaric and oxalic, dissolve it freely. In water acidulated with sulphuric or other acid it readily dissolves, and this property is taken advantage of in administering the medicine in a liquid form. The manufacture of quinine is extensively carried on in Paris, in Stratford, England, and in Frankfort, from which place Russia, Prussia, and Austria are chiefly supplied with this medicine. In Philadelphia the business of extracting it from the bark is conducted in chemical establishments also upon a very large scale. The quinine in the process of its extraction is commonly converted into the sulphate, which is the salt chiefly employed in medicine, and of which from 2.5 to 3 per cent. is usually obtained from the yellow bark. The processes employed vary somewhat in different countries. From a strong decoction of the bark in water, acidulated with hydrochloric acid and filtered, the quinine may be set free from its combination with kinic acid and precipitated by addition of lime water; some lime combined with coloring matter falls with it. The precipitates are well washed with water, and the residuum is pressed, dried, and pulverized. It is then repeatedly treated with alcohol, which dissolves the quinine and leaves most of the impurities. These being separated, the solution is concentrated by evaporation to a brown viscid mass, which is impure quinia; or the tincture in the distilling vessel may be neutralized with sulphuric acid, and the alcohol being then distilled off, an impure sulphate is obtained which crystallizes on cooling. This is expressed, and then dissolved in boiling water to which purified animal charcoal has been added. It is filtered while hot, and then allowed to cool and crystallize. The purification is completed by again dissolving and crystallizing. Sulphate of cinchonina is commonly present, but being more soluble does not crystallize so readily as the sulphate of quinia, and remains in the mother liquor. This also contains what Liebig regards as an amorphous variety of quinine, which is analogous in its properties to uncrystallizable sugar; it is known as qui-

noidine, and possesses the same medical properties as the sulphate. It probably consists chiefly of quinicina and cinchonina. The soluble salts of quinia form precipitates with tannic acid, with the soluble salts of lead and baryta, with a solution of iodine in iodide of potassium, and with the iodohydrargyrate of potassa. It is distinguished from the other alkaloids, with the exception of quinidia, by the production of an emerald green color when the solution is treated first with the solution of chlorine and then with ammonia, and which changes to a white or violet upon saturation with a dilute acid. Some of the salts of quinia, especially the sulphate, possess the remarkable property, called fluorescence, of rendering visible as a pale blue the ultra-violet rays of the spectrum, and an exceedingly small quantity may be detected by examining even in ordinary light a long tube filled with its colorless solution. The test is much more delicate when the electric light is used. Hydrochloric acid or chloride of sodium renders the reaction much less distinct, or in ordinary light imperceptible. The sulphate of iodoquinia, as well as the corresponding salts of the other alkaloids, possesses the property of polarizing light, in which it is equal if not superior to tourmaline. Quinidia is isomeric with quinia, and resembles it in many of its chemical reactions. It is distinguished from quinia by its greater facility of crystallization, its less solubility in ether, and its influence on polarized light. It forms a precipitate with iodide of potassium, a property possessed by no other cinchona alkaloid. Cinchonina has the formula $C_{40}H_{24}N_2O_2$, is crystallizable, only very slightly soluble in water, cold alcohol, and ether. It forms salts with acids. It is obtained chiefly from the pale barks. Cinchonidia is isomeric with cinchonina, but differs from it in being more soluble in ether and also in its influence on polarized light. Commercial quinidia generally consists of quinidia proper with a much larger proportion of cinchonidia. Quinicina and cinchonina are isomeric with quinia and cinchonina respectively, but are uncrystallizable. The different varieties of bark contain these alkaloids in varying proportions, the yellow yielding chiefly quinia, the pale a larger proportion of cinchonina with but little quinia, and the red a considerable proportion of each. According to the "United States Pharmacopœia," cinchonina bark should contain at least 2 per cent. of the proper cinchona alkaloids which yield crystallizable salts.—The cinchonina alkaloids, and especially the sulphate or disulphate of quinia, are largely used in medicine. Their most striking and earliest discovered property is that of preventing an expected access of intermittent fever. For this purpose quinia should be administered in large doses. Two to 15 grains may be given at a time some hours before the expected chill, but not more than 30 or 40 grains should be given during the 12 hours preceding one. If administered sub-

cutaneously, a smaller quantity will suffice. It is also extensively used in other forms of malaria and diseases dependent thereon. For these uses, and also as a prophylactic (against malaria), quinia has been found almost as important to the traveller in malarial regions as a good supply of food. It has been said that the British rule in India is founded upon cinchona bark. A full dose of quinia reduces the pulse and the bodily temperature, and it has been applied in diseases not malarial, such as typhoid fever, erysipelas, pyemia, and rheumatism. It has until recently been difficult to explain the acknowledged therapeutic action of quinia by any well ascertained physiological action; but within a few years it has been discovered to possess certain properties which may serve as a clue to the method of its action in disease. It has been found that it is capable of arresting or delaying various kinds of fermentation, of killing the microscopic organisms accompanying putrefaction, of arresting the amœboid movements of the white blood corpuscles, and of preventing the escape of these corpuscles from the mesenteric vessels of the frog, when prepared as in the well known experiment of Cohenheim. In animals poisoned by the injection of putrid fluids into the veins, it has been found that those to which quinia was administered lived longer than those without it. The other alkaloids probably have the same power, but in a less degree. Cinchonia is about one half less powerful than quinia. The amorphous residue left after the crystallization of quinia may be used for the same purposes, but is inconvenient from the circumstance of there being no satisfactory test for its strength and purity. Quinia and the other alkaloids give rise to certain nervous symptoms, of which the most prominent are headache, a feeling of fullness and tightness in the head, buzzing in the ears, and temporary deafness. Permanent deafness is a rare accident. Quinia or the other alkaloids may be administered in the form of pills or in solution. In the latter form the intense bitterness is a serious objection to their use. This may be partially disguised by sirups, aromatics, extracts of licorice, dandelion, &c. Tannin renders quinia less bitter because less soluble. Various combinations of quinia with iron, strychnia, phosphorus, &c., are in use. When a simple tonic effect is desired, the preparations of the bark itself may be advantageously used.

CININNATI, the chief city of Ohio, capital of Hamilton county, and in population the eighth city of the United States. It is situated in lat. $39^{\circ} 6' N.$, lon. $84^{\circ} 27' W.$, on the N. bank of the Ohio, 250 m. direct, or by the river 466 m., S. W. of its head at Pittsburgh, Penn.; 290 m. direct, or 500 m. by river, N. E. of its mouth at Cairo, Ill.; and 390 m. W. of Washington. Its site is peculiarly favorable to commerce, comfort, and health. The main city lies on a plateau, through which the Ohio passes from N. E. to S. W. This plain is nearly 12 m. in cir-

cumference, and is divided by the river into nearly equal parts. The city is surrounded by hills from 400 to 465 ft. in height, forming one of the most beautiful natural amphitheatres on the continent, from whose hilltops may be seen the splendid panorama of the cities below, and the winding Ohio. No other large city of the United States affords such a variety of position and scenery. Commencing on the east, the hills border the river within 500 yards of its bank for $4\frac{1}{2}$ m.; then recede, form an amphitheatre around the plateau on which the city was first laid out, and return with a bold promontory to the river 3 m. below; thence they follow its windings, within 300 yards of the shore, $1\frac{3}{4}$ m. further, to the western corporation line. By following ravines between the spurs, practicable roads have been constructed to the summits of these hills. The greater part of the city is built upon two terraces or plateaux, respectively 60 and 112 ft. above the river. The amphitheatre of hills enclosing these plateaux is cut by the ravine-like valley of Deer creek entering from the northeast, and by the broad plain of Mill creek valley, extending from the north through the W. extremity of the plateau portion of the city to the river. The former is a dry torrent bed; the latter a considerable stream, with low banks and a valley within the city from 1 to $1\frac{1}{2}$ m. wide. Through this valley the city has its greatest breadth, $5\frac{1}{2}$ m. The upper plateau, uniting with the higher grounds of Mill creek valley, extends many miles north with very little increase of elevation, thus affording space for future growth. The city stretches along the river about 10 m., from and including the village of Columbia on the east to that of Riverside on the southwest, with an average width of 3 m., and embracing an area of 24 sq. m. The main body of the city, including the business portion and the densest population, borders on the river between the mouth of Deer creek on the east and that of Mill creek on the west, a distance of $2\frac{1}{2}$ m. North of East Liberty-street and Hamilton road, the hillsides from Deer creek to Mill creek are terraced with streets, and generally covered with dwellings to their summits. Mount Adams, overlooking the S. E. corner of the plateau, has streets thickly lined with dwellings on its summit and W. and S. sides. The remainder of the city, including the narrow valleys along the river, above and below the city proper, the village of Cummins ville next the northern corporation line in Mill creek valley, and the several tableland villages, from Woodburn on the east to Fairmount on the west, is irregularly built. In the N. W. part are native forests and cultivated farms. On the western hills are vineyards and gardens. Between Harrison avenue and the 25th ward (Cummins ville) are many vegetable gardens. The numerous villages annexed to the city since 1868 retain their former names. The most important of these,

enumerating from east to west, are Columbia, Walnut Hills, Mount Auburn, and Cummins-ville. The river at this point rises during floods from 50 to 55 ft. above low-water mark. In 1832 it rose to a height of 62½ ft., and 57 ft. in 1848. Nearly 1,200 acres of city land, chiefly in Mill creek valley, are subject to inundation by extreme high water; but many acres have been filled above high-water mark and built upon, and further improvement is in rapid progress. Cincinnati is noted for its picturesque surroundings and suburbs. On the opposite bank of the Ohio, on a plateau surrounded by an amphitheatre of hills, are Covington and Newport, Ky., separated by Licking river. The outer highland belt of the city commands distant views of hills in Kentucky and Ohio, and of the valleys of Mill creek, the Licking, and the Ohio. It is beautified by elegant residences in the midst of extensive high-

ly cultivated landscape lawns, whose shrubbery is often the native forest, and is traversed by winding avenues. From the eastern corporation line, through East Walnut Hills and Woodburn to West Walnut Hills, mansions occupy grounds of from 3 to 75 acres. Blue limestone is used in the construction of the finest buildings. West Walnut Hills and Mount Auburn, though in parts quite compactly built, abound in elegant and costly residences, each having from one to five acres of grounds. The highlands W. of the city, between Fairmount and the river, have beautiful scenery, but owing to difficulty of access they are but partially occupied. Outside the city, 3 m. from the post office, and overlooking Mill creek valley to the west, is the village of Clifton, comprising many beautiful groves and costly residences. Fences and hedges are almost entirely discarded, and the luxuriant



Cincinnati.

lawns extend to the roadside, covered with every variety of trees. Here the finest mansions are of blue limestone. The grounds around them range from 10 to 80 acres in extent. There are here fine specimens of the Anglo-Norman, Gothic, and modern Italian styles of architecture. Avondale lies E. of Clifton and N. of Mount Auburn and Walnut Hills, 3 m. N. E. of the custom house, and contains 800 acres. It has elegant residences with large grounds, and commands views of the surrounding hills; but it is shut out from river prospects. College Hill, the seat of Farmer's college and the Ohio female college, is situated W. of and overlooking Mill creek valley, 7 m. N. of the custom house, on the highest ground in Hamilton county. Cincinnati proper is rapidly surrendering its dwellings to business, while residences

multiply on the hills and in the suburbs. —The increase of the population of Cincinnati has been very rapid. In 1800 it was 750; in 1810, 2,540; 1820, 9,602; 1830, 24,831; 1840, 46,338; 1850, 115,436; 1860, 161,044; 1870, 216,239. Of the population in 1870, 136,627 were of native and 79,612 of foreign birth; 210,335 white, and 5,900 colored. The foreign population embraced 49,448 born in Germany, 18,624 in Ireland, 3,526 in England, 2,093 in France, 995 in Switzerland, 787 in Scotland, and 507 in Wales. There were 53,814 voters. The city contained 24,550 dwellings, with an average of 8·81 persons to each; and 42,937 families, with an average of 5·04 in each. The number of persons engaged in industrial occupations was 77,923, of whom 1,420 were employed in agriculture, 25,666 in professional and personal services, 16,865 in trade and

transportation, and 33,972 in manufactures and mining.—The city is regularly laid out, the streets crossing each other at right angles. They are generally from $1\frac{1}{2}$ to $2\frac{1}{2}$ m. long, with a width varying from 50 to 100 ft. West of Central avenue they run N. from the river and E. from Mill creek, while E. of that avenue their direction from the river is slightly W. of N. The streets and avenues are generally paved or macadamized, many of them being adorned with shade trees. The buildings are substantial, and chiefly of brick. A grayish buff freestone for fronts is almost universally used for large business houses and the finest residences in the city proper, though many of the residences on the hills are of wood. The prevailing height of business buildings is five stories, though many are six. Dwellings are generally high and narrow, and seldom have front yards. The chief mercantile quarter covers about 300 acres, and lies between Fifth street and the river, and Broadway and Smith street. Business is not concentrated as in most other cities. Manufactories are scattered through all parts of the city and its suburbs. Pearl street, which contains nearly all the wholesale boot and shoe and dry goods houses, is noted for its splendid row of lofty uniform stone fronts between Vine and Race streets. Fourth street, the fashionable promenade, and the most select retail business street, between Broadway and Central avenue, a mile in extent, is noted for its splendid stone front buildings. Third street, between Main and Vine, contains the banking, brokerage, and insurance establishments, and the attorneys' offices, and W. of Vine street the large clothing houses. Within a quarter of a mile of the custom house and post office are the chief theatres, newspaper offices, and libraries. In Pike street, in Fourth street from Pike to Broadway, and in Broadway between Third and Fifth streets, are the mansions of the "east end;" in Fourth street W. of Smith street, in Dayton street, and in Court street between Freeman and Baymiller streets, those of the "west end." The large district N. of the Miami canal, which enters the city from the N. W. and extends S. to Canal street, thence E. to the Ohio river, is known as "Over the Rhine." It is densely populated, almost exclusively by Germans, has numerous beer gardens, saloons, and concert halls, and is thoroughly German in its characteristics. In this vicinity are all the great breweries of Cincinnati. At the foot of Main, Sycamore, and Broadway, along Front street, is the public landing, an open area paved with bowlders, 1,000 ft. long, with a mean width of 425 ft. Above the public landing, for $1\frac{1}{2}$ m., are the marine, railway, and dry docks, and boat yards. Between Central avenue and the foot of Fifth street are situated the extensive coal wharves and elevators. In the vicinity of the city there are many beautiful drives; one of the most attractive is that from the Brighton house, at the junction of Central avenue and Freeman

street, to Spring Grove cemetery, and thence returning to the city by way of Clifton or Avondale.—Cincinnati is well provided with parks and public grounds. Chief among these is Eden park, on a hill in the eastern district, and commanding magnificent views of the city, the valley of the Ohio, and the surrounding country. It contains 216 acres. Lincoln, Washington, Hopkins, and the city parks are in central parts of the city, and contain an aggregate of about 25 acres. Burnet Woods, on the hill N. of the city, purchased in 1872, contains 170 acres, nearly all forest. Spring Grove, one of the most beautiful cemeteries in the west, lies 3 m. N. W. of the city, in the valley of Mill creek, and is approached by an attractive avenue 100 ft. wide. It contains 600 acres, comprising much picturesque wooded land tastefully laid out, and has about 100



Tyler Davidson Fountain.

monuments, costing from \$5,000 to \$15,000 each. The entrance buildings are in the Norman Gothic style, and cost more than \$50,000. The chief attractions are the Dexter mausoleum, representing a Gothic chapel, and the soldiers' monument, cast in Munich, and erected in 1864. It is a bronze statue, with granite pedestal, representing a soldier of the United States standing on guard. The most notable work of art in Cincinnati is the Tyler Davidson fountain, in Fifth street (140 ft. wide), between Vine and Walnut. It stands on a freestone esplanade 60 ft. wide by 400 ft. long. In the centre of a porphyry-rimmed basin 40 ft. in diameter is the quatrefoil Saxon porphyry base supporting the bronze work, whose base is 12 ft. square and 6 ft. high, with infant figures in niches at each corner representing the delights of children in water. Its faces are ornamented

with panels containing figures in low relief representing the various uses of water to mankind. From the upper part of the bronze base extend four great basins, one to each side, with perforated rims; two of the basins have jets. From the top of the base or socle rises a column up whose sides vines ascend and branch at the top in palm-like foliage. Around this column are groups of statuary; and on its summit stands a gigantic female figure with outstretched arms, the water raining down in fine spray from her fingers. Four bronze figures on pedestals around the rim of the basin serve as drinking fountains. There are in all 15 figures. The height of the topmost figure above the street is 45 ft. The work was cast in Munich at the royal bronze foundery, and cost nearly \$200,000. It was suggested by Mr. Tyler Davidson, and after his death completed and presented to the city by Mr. Henry Probasco. It was unveiled Oct. 6, 1871. It plays during warm days from morning till midnight. The suspension bridge from Cincinnati to Covington, designed by John A. Roebling, and constructed at a cost of \$1,800,000, extends 1,057 ft. between the towers, from centre to centre, and with the approaches is 2,252 ft. long. Two wire cables, each a foot in diameter, pass over stone towers 200 ft. high, each surmounted by two turrets of 30 ft., and sustain the bridge, all iron except the flooring, at a height of 103 ft. above low-water mark. It has a double wagon way between the cables, passing through an arched opening in each tower, and a foot way on the outer side of each cable. It was opened for use Jan. 1, 1867. About 3,000 ft. further up the river, a wrought-iron railroad pier bridge, 100 ft. above low water, with wagon and foot ways on its sides, crosses the Ohio from Cincinnati to Newport. It has 11 spans, the widest being 405 ft. The distance between the abutments is 1,780 ft. The railway track, with its approaches, is 3,090 ft. long, and the highway track 2,082 ft.—Cincinnati contains many public edifices distinguished for their size and architectural beauty. The United States government building, 150 ft. on Vine street by 80 ft. on Fourth street, is of sawed freestone, three stories high, in the Roman Corinthian style; in Fourth street it has a porch supported by six columns of freestone. It contains the post office, depository, custom house, United States court, and other government offices. The county court house, in Main street, facing Court street, is 175 ft. square and three stories high, nearly fire-proof, of iron, brick, and Dayton stone, in the Roman Corinthian style. The front in Main street has a porch with six Corinthian columns of stone. It contains all the courts, except the police and national, all the county offices, and the law library. It was built in 1853, at a cost of \$500,000. With the county jail, 150 ft. square, in its rear, it occupies an entire square. The city buildings, erected in 1853, are of brick, 205 ft. long by 52 ft. wide. The ground, in-

cluding the city park of $1\frac{1}{2}$ acre, cost \$60,000; the buildings about \$27,000. They contain the council chamber, police court, and all the city offices. The city workhouse, completed in 1868, is in Mill creek valley, $\frac{3}{4}$ m. from the custom house. It is of brick, in Romanesque style, 515 by 55 ft.; cost of buildings, \$600,000; the grounds, 26 acres, cost \$50,000. It has cells for 700 prisoners. In its rear are workshops and grounds, enclosed by a high stone wall. Longview asylum for the insane, at Carthage, 10 m. from the city, is of brick, in the Italian style, 612 ft. long and three and four stories high. Its value, with 110 acres of grounds, is \$1,000,000. Cincinnati hospital, in Twelfth street, between Central avenue and Plum street, occupies a square of about four acres. It consists of eight distinct buildings, arranged around a central court and connected by corridors. In the centre, fronting Twelfth street, is the administrative block, four stories high; opposite it, in the rear, are the culinary and laundry buildings; flanking these are six pavilions, three on a side, arranged *en échelon* and three stories high, built of brick trimmed with freestone, in the modern French style, with Mansard roofs. The hospital was first occupied in January, 1869, and cost, with furnishing, \$703,572, exclusive of the ground, which is worth \$300,000. It has capacity for 700 patients. The public library building, between Sixth and Seventh streets, occupies a lot 80 ft. wide in Vine street, running back 190 ft. to College street. It comprises two distinct buildings, connected by a corridor two stories high, 33 ft. long by 44 ft. wide. The building fronting on Vine street is 80 by 45 ft., and four stories high; the one in the rear is 80 by 112 ft. An iron arch, 40 ft. wide and 90 ft. long, rests on the brick walls of the clear roof. These walls are supported by 16 wrought-iron columns, from which to the wall, 18 ft. above the ground floor, is the gallery. The buildings are of brick, in the Romanesque style, with a stone front in Vine street. The main hall will cost \$500,000; the entire buildings, with the grounds, about \$675,000. They are built from funds raised by taxation by the board of education. Masonic temple, on the N. E. corner of Third and Walnut streets, an imposing freestone front building in the Byzantine style, is 195 by 100 ft., four stories high, with two towers each 140 ft., and a spire 180 ft. high. The basement, ground, and second stories are used for offices and business purposes; the two upper stories for lodges, &c. It was commenced in 1859, and completed at a cost of about \$200,000. Pike's opera house, in Fourth street, between Vine and Walnut, is one of the most imposing structures of the kind in the United States. It is five stories high, with a front of 134 and a depth of 170 ft. The front is of fine sandstone, in the Elizabethan style. Mozart hall, corner of Vine and Longworth streets, is a massive stone building, with an auditorium which will seat 3,000 persons. St.

Xavier's college, a splendid building in the Romanesque style, on the corner of Seventh and Sycamore streets, is 70 by 125 ft., and four stories high. When extended it will be L-shaped. It is of brick, with profuse ornaments of stone, and a splendid double portico of the same material. It cost \$125,000. The Wesleyan female college, in Wesley avenue, between Court and Clark streets, erected in 1868, is built of white stone, in a highly attractive style of architecture, and is surrounded by ornamental grounds. It is 180 ft. long, 60 and 90 ft. deep, and four stories above the basement, with a Mansard roof. It has accommodations for 300 day and boarding pupils. The Hughes high school, in Fifth street, is an imposing edifice in the Gothic style, with octagon towers at the corners. The medical college of Ohio is a quaint-looking structure in Sixth street, W. of Vine. The finest church edifice in Cincinnati is St. Peter's (Roman Catholic) cathedral in Plum street. It is of Dayton limestone, in pure Grecian style, 200 ft. long and 80 ft. wide, with a stone spire 224 ft. high. Fronting Plum street it has a portico supported by ten sandstone columns, arranged by fours on three sides, which are approached by flights of full-length steps. The height of the interior, from floor to ceiling, is 55 ft.; 18 stone pillars, 9 on each side, separate the nave from the aisles. The altar, of Carrara marble, was made in Genoa. St. Paul's church (Methodist), in Seventh street, in the English transition style of the 13th century, is of blue limestone, cruciform, 130 by 85 ft. It has a finely finished interior, and a spire 200 ft. high. It cost (in 1871) \$175,000. St. John's (Episcopal) church, in Seventh and Plum streets, built in the Norman style, is of stone and stuccoed brick. It is cruciform, 90 by 105 ft. in extreme dimensions. Its most striking features are its unfinished square towers, rough ashlar gable, and deep and lofty Norman door, facing Seventh street. The first Presbyterian church, in Fourth street, is noted for its huge tower, surmounted by a spire 270 ft. high, terminating with a gilded hand, the finger pointing upward. The two Hebrew temples are fine and large structures. That in Plum street is of brick, profusely ornamented with stone, built in the Moorish style, 120 by 110 ft., and cost \$250,000. That in Mound street is also of brick trimmed with stone, Gothic in style, 135 by 60 ft., and gorgeously frescoed inside.—North of the Ohio, Cincinnati has only three natural avenues of approach by railroad: two between the base of the hills and the river E. and W. of the city, and one through Mill creek valley from the north. In 1873 these approaches were occupied by six railroads, three of which had double tracks for a distance of 15 to 25 m. from the city. These lines were used by the following companies: Atlantic and Great Western; Cincinnati, Hamilton, and Dayton; Cincinnati and Indiana; Cincinnati and Indianapolis Junction; Cincinnati, Rich-

mond, and Chicago; Cincinnati, Sandusky, and Cleveland; Cincinnati and Muskingum Valley; Cleveland, Columbus, Cincinnati, and Indianapolis; Dayton and Michigan; Harrison Branch; Little Miami; Marietta and Cincinnati; and Ohio and Mississippi. Terminating at Covington are the Kentucky Central, and the Louisville, Cincinnati, and Lexington railroads. The daily arrivals and departures on these roads are 124 passenger and 150 freight trains. These railroads enter four depots, all near the river, one in the eastern, one in the central, and two in the western part of the city proper. The eastern and western depots are connected by a track through the city for restricted use in the transfer of freight. The Miami canal connects with Toledo on Lake Erie. Telegraphic communication is afforded by the Western Union company, with 40 lines, the Pacific and Atlantic with six, and the Atlantic and Pacific with two. There are eight lines of river packets running regularly between Cincinnati and various points on the Ohio, Cumberland, Mississippi, Arkansas, White, and Red rivers. There are 14 lines of omnibuses and stages running from the city to distances of from 5 to 30 m. into the country; and 14 lines of street railroad, with 45 m. of track, traversing the city in various directions. An inclined railway for passengers by a plane about 800 ft. in length, operated by steam, makes an ascent of 275 ft. from the bottom to the top of one of the northern hills. Three other incline railways, to ascend the hills at other points, are projected. Besides the two bridges above mentioned, there is communication by 3 ferries with Kentucky.—The central position of Cincinnati in relation to extensive producing regions and to leading channels of commerce, by water and by rail, renders it one of the most important commercial centres of the west. The commercial growth of the city is exhibited in the following statement of the aggregate imports and exports for the years ending respectively Aug. 31:

YEARS.	Imports.	Exports.
1854-'55.....	\$67,501,341	\$38,777,394
1858-'59.....	94,213,247	66,007,707
1862-'63.....	144,189,213	102,397,171
1866-'67.....	335,961,233	192,929,317
1868-'69.....	283,927,903	163,084,358
1869-'70.....	312,978,665	193,517,690
1870-'71.....	283,796,219	179,848,427
1871-'72.....	317,646,608	200,607,040

The number and tonnage of steamers and barges plying between Cincinnati and other points, during the years specified, are as follows:

	No.	Tonnage.		No.	Tonnage.
1850.....	233	49,274	1870.....	327	78,109
1860.....	338	71,642	1871.....	325	81,801
1865.....	446	91,686	1872.....	354	85,721

The value of the chief articles represented in this trade, for the two years ending Aug. 31, was:

ARTICLES.	1870-'71.		1871-'72.	
	Imports.	Exports.	Imports.	Exports.
Ale, beer, porter	\$56,705	\$1,296,999	\$46,100	\$1,439,075
Boots and shoes	8,602,374	3,995,122	8,690,168	3,442,672
Butter.....	1,711,775	22,876	1,673,952	33,138
Cattle.....	7,797,502	3,463,070	9,242,025	5,380,620
Coal.....	2,300,000	87,000	4,356,000	495,000
Coffee.....	6,798,580	5,307,555	4,759,326	3,342,030
Corn.....	1,158,584	437,208	596,634	143,047
Cotton.....	19,124,113	15,359,904	12,334,923	12,321,645
Furniture.....		5,504,760		6,236,953
Flour.....	3,951,242	3,069,439	4,371,973	2,668,256
Hogs.....	10,414,960	994,736	12,525,348	2,012,239
Iron, pig.....	2,156,804	996,762	5,087,650	2,467,088
Iron and steel.....	5,480,860	8,939,755	5,920,680	6,215,475
Lard.....	1,557,989	4,191,532	1,277,355	3,382,554
Lumber.....	6,450,000		3,417,000	
Pork and bacon.....	2,628,356	9,114,078	3,082,772	12,981,151
Tobacco.....	12,187,914	18,600,545	10,388,685	10,957,155
Wheat.....	1,126,397	545,158	1,219,430	523,916
Whiskey.....	16,592,816	18,750,450	13,962,400	19,788,200

About three fourths of the transportation of exports from Cincinnati is by railroads and canals, one twelfth by river up the Ohio, and one sixth by river down the Ohio and Mississippi and on their tributaries. Boats in 1873 averaged 330 tons capacity, against 250 tons in 1855. Vessels carrying 1,500 tons run to this port. The employment of tow boats, with barges for carrying all classes of merchandise, is extensive and daily increasing. Such a boat of 350 tons capacity will take 1,200 tons of freight in barges up stream, or 3,000 tons down. The completion of the canal around the falls of the Ohio, at Louisville, enabling boats 300 ft. long and 80 ft. wide to pass through nearly the whole year, has had an important effect upon the river trade of Cincinnati. Since the opening of this great work in 1872, large Mississippi river steamers have been enabled to come up to the city. Boat-building constitutes an important industry. In 1872, 20 steamboats and barges of 7,761 tons

were built, and in 1871, 25 of 12,758 tons. By the act of congress, July 14, 1870, Cincinnati was made a port of entry. Direct foreign importations since then have been, in import value, as follows: 1870, \$1,058,226; 1871, \$1,326,868; 1872, \$1,463,984. The chief articles of import are tea, coffee, and textile fabrics. In 1871 Cincinnati merchants withdrew from the original port of entry \$52,000,000 worth of imported goods.—The central situation of the city with reference to extensive iron and coal producing regions has given it great advantages as a manufacturing centre. The following is a summary of the manufactures of Cincinnati in 1872 (to Dec. 31), compared with 1860:

CLASSIFICATION.	HANDS.		VALUE OF PRODUCTS.	
	1860.	1872.	1860.	1872.
Iron.....	8,885	10,237	\$5,205,696	\$25,725,431
Other metals.....	770	1,573	1,464,738	4,344,650
Wood.....	4,342	8,204	5,396,153	15,231,039
Leather.....	2,253	5,209	2,820,234	7,966,514
Food.....	787	2,621	7,423,550	17,729,944
Soap, candles, oils...	889	1,011	3,423,293	8,436,039
Clothing.....	10,440	14,503	6,737,683	13,229,215
Liquors.....	632	1,870	4,894,821	21,536,831
Cotton, hemp, &c.....	626	898	756,063	1,418,800
Drugs, chemicals,&c.....	418	602	1,204,360	2,473,650
Stone and earth.....	950	1,565	886,850	3,666,719
Carriages, cars, &c.....	739	1,268	788,185	2,216,462
Paper, &c.....	229	432	353,163	1,332,097
B'kbind'g and blank books.....	101	353	131,170	702,853
Printing & publish'g.....	1,043	2,253	1,503,101	4,551,180
Tobacco.....	539	3,549	615,856	5,567,343
Fine arts.....	159	144	199,750	695,196
Miscellaneous.....	2,348	2,013	3,282,416	6,600,662
Totals.....	30,268	53,508	46,995,062	143,456,675

There were 3,971 establishments in 1872, occupying \$45,164,954 worth of real estate, and employing \$55,265,129 cash capital. The leading interests for the year ending Jan. 1, 1873, were:

CLASS.	No. of Establishments.	No. of Hands.	Cash Capital.	Value of Real Estate Occupied.	Value of Products.
Book and newspaper publishing.....	62	1,326	\$1,808,000	\$2,500,000	\$2,813,500
Boots and shoes.....	514	3,854	1,545,093	917,000	3,737,000
Packing boxes.....	7	146	277,562	47,800	307,875
Bakery products.....	207	1,232	313,200	437,000	1,623,500
Building materials not brick or stone.....	16	1,276	1,164,569	1,750,000	2,185,136
Candles, soaps, and oils.....	29	1,011	1,983,000	1,013,000	8,436,039
Clothing.....	341	13,493	8,750,000	4,175,000	12,410,674
Furniture.....	132	4,067	3,646,519	3,406,400	7,813,040
Gas.....	1	280	1,000,000	1,406,004	1,040,610
Iron castings.....	17	877	813,000	625,000	2,638,000
Iron, forged and rolled.....	13	1,226	1,417,200	1,231,000	4,214,500
Iron, pig.....	2	127	500,000	45,000	1,100,000
Leather.....	38	660	1,213,000	825,000	2,560,714
Liquors, distilled.....	31	368	1,483,000	607,000	5,754,978
“ malt.....	35	917	2,728,000	3,110,000	4,102,873
“ rectified.....	80	502	3,000,000	873,000	11,395,930
Wine.....	5	83	75,000	40,000	258,000
Machinery.....	42	1,632	3,410,000	2,937,000	4,828,306
Job printing.....	71	932	650,000	575,000	1,737,680
Provisions.....	84	897	5,000,000	2,700,000	12,633,297
Railway materials and supplies.....	7	517	683,000	464,000	1,666,000
Fire safes.....	4	1,135	835,000	410,000	2,932,000
Stoves and hollow ware.....	11	1,451	1,147,000	1,313,000	2,051,013
Stone and marble work.....	38	986	1,118,500	968,000	2,813,000
Cigars.....	270	1,320	625,000	673,000	2,045,356
Tobacco, plug, fine cut, and snuff.....	30	1,513	675,000	650,000	2,767,748
Colors, paints, &c.....	5	195	750,000	235,000	1,300,000
Starch.....	3	206	310,000	320,000	770,000

Perhaps the most prominent industry is the slaughtering of swine and the packing of pork. Formerly Cincinnati enjoyed a supremacy in this branch, which is now held by Chicago, 1,225,236 swine having been packed in the latter city in 1871-'2, and 917,197 in the preceding year. There are 51 houses in the city that cut and pack pork, besides a large number which purchase green meats for packing or pack elsewhere. The union stock yards, in Spring Grove avenue (nearly completed), occupy 60 acres, 30 of which are covered with houses and pens. The regular packing season extends from Nov. 1 to March 1; but recently summer packing has been carried on extensively. The extent of this industry for 1870-'71 and 1871-'72 was as follows:

WINTER PACKING.

	1870-'71.	1871-'72.
Whole number of hogs packed....	481,560	630,301
Average gross weight, lbs.	298.84	280
Aggregate gross weight, lbs.	143,909,390	182,288,061
Average yield per head of lard, lbs.	42.62	41.02
Total yield of lard, lbs.	20,524,087	25,857,465
Average price paid, gross.	\$6 65	\$4 86
Aggregate cost.	\$9,574,004	\$7,956,385
Pork packed, bbls.		65,777

The whole number packed between March 1 and Nov. 1, 1871, was 87,515, making an aggregate of 717,816 for the season of 1872. In 1872 were manufactured from the product (other than provisions) of hogs slaughtered \$8,436,039 worth of candles, soaps, and oils, \$250,000 worth of bristles and curled hair, about \$100,000 worth of grease and \$125,000 worth of artificial guano; total \$8,911,039. The exports of the product of the hog for the year ending Aug. 31, 1872, were: pork and bacon, \$12,981,151; lard, \$3,531,327; lard oil, \$2,838,810; candles, \$1,799,633; soap, \$494,790; total, \$21,645,717. During the winter season of 1872-'3 the number of hogs packed was 626,305; cost, \$7,492,030; total net weight, 152,766,653 lbs; yield of lard and trimmings, 28,604,877 lbs. The manufacture of iron in all its branches has grown with great rapidity, and promises to take the leading rank in the industrial products of the city. The manufacture of furniture is also increasing rapidly. In 1872, 13,530,973 gallons of lager beer were made from 1,209,249 bushels of barley and 991,235 lbs. of hops; \$4,500,000 capital was invested in this business, and 1,306 hands were employed, at an annual cost of \$1,200,000. Large shipments of this beverage are made to the southern states, the West Indies, and Mexico. The number of gallons of liquor distilled in 1869 was 4,707,440; in 1870, 5,951,120; in 1871, 7,488,796. The number of gallons rectified in 1869 was 9,949,632; in 1871, 13,233,634. In 1873 there were 7 state and national banks, with an aggregate capital of \$4,800,000; 15 private banks, with \$2,300,000 capital; and 2 savings banks with deposits of \$540,000 from 5,522 depositors. There were

24 fire and marine insurance companies, with \$5,000,000 capital, and \$3,360,000 income (1872) from premiums; two life insurance companies, with \$200,000 capital, and \$384,298 income from premiums; one mutual health insurance company, with \$30,175 income from premiums, and \$16,480 losses on risks.—The government of Cincinnati is vested in a mayor elected for two years, with a salary of \$4,000, a board of 25 aldermen, one for each ward, and a board of 50 councilmen, or two for each ward. The board of education consists of 50 members, elected by the people. The courts are: common pleas, of 5 judges; superior, with civil jurisdiction in city cases, of 3 judges; probate, of 1 judge; police court, 1 judge; 10 magistrates' courts; and a district court, with a state supreme judge. The United States circuit and district courts for the southern district of Ohio are held in Cincinnati. The fire department is under the control of five commissioners, who are appointed by the mayor. It is a paid department, employing 158 men, 19 steam fire engines, 1 hand engine, 1 hose carriage, 4 hook and ladder carriages, and 86 horses. There are 228 miles of fire alarm telegraphic lines and 170 signal boxes. The police are under the control of the mayor and 4 commissioners, and their number is limited to 12 captains, 20 other officers, and 300 patrolmen. The city is divided into 10 police districts, each with a station house. In 1872, 12,500 arrests were made. The police telegraph has 20 m. of wire. Water is obtained from the Ohio river. The water works, in East Front street, are of great magnitude. There are four powerful pumping engines, with an average daily capacity of 19,000,000 gallons. The reservoir contains 4,500,000 gallons, and the average daily consumption of the city is about 17,000,000. Two reservoirs, with a capacity of 100,000,000 gallons each, are in process of construction in Eden park. The value of the entire works is \$4,247,557. The total receipts in 1872 were \$610,961. The sewerage of the city was much neglected until about 1870. In 1873 about 30 m. of sewers had been built, some of which were 14 ft. in diameter. The cost of the city government in 1872 was \$4,220,403. Its revenues were \$4,976,544, of which \$3,297,518 was from taxation. The chief expenditures were: for schools, \$717,969; police, \$367,041; redeeming bonds, \$105,760; fire department, \$287,343; street improvements, \$435,484. The bonded debt, April 1, 1873, was \$6,001,500. The tax levy for city purposes for 1869 was \$2 80 on each \$100 of the tax duplicate, producing a revenue of \$3,150,243; 1870, rate \$2 39½, revenue \$3,259,768; 1871, rate \$1 68, revenue \$3,039,100; 1872, rate \$1 51, revenue \$2,643,772. Property in churches, &c., exempted by law from taxation, amounted in 1872 to \$5,029,690, and the value of city property not taxed was \$15,237,194. The increase in the value of property, the rate of tax, and the amount of tax revenue (including

both city and county taxes) are shown in the following statement:

YEARS.	Real Estate.	Personal.	Rate of Tax.	Amount of Revenue.
1830.....	\$3,157,675	\$1,048,529	1-20	\$51,435 00
1840.....	4,731,390	1,440,108	2-45	151,201 00
1850.....	34,194,430	8,668,298	-70	728,666 00
1855.....	60,335,932	24,994,948	1-48	1,262,897 00
1860.....	61,428,917	30,532,458	1-745	1,666,231 00
1861.....	62,077,837	30,318,411	1-92	1,833,954 00
1862.....	63,503,296	29,707,861	7-766	1,709,824 00
1863.....	64,441,532	35,932,561	1-820	1,878,847 00
1864.....	65,385,774	49,809,574	2-020	2,339,765 00
1865.....	67,610,611	63,135,382	2-29	3,050,000 00
1866.....	66,454,662	67,218,101	2-16	2,924,515 00
1867.....	63,569,040	68,412,255	2-74	3,786,685 89
1868.....	69,799,604	61,583,925	2-80	3,723,056 59
1869.....	72,243,844	58,471,606	3-19	4,199,413 80
1870.....	78,736,482	57,370,754	3-16	4,362,197 16
1871.....	123,427,888	56,934,044	2-22	4,004,084 00
1872.....	119,621,886	55,462,410	2-01	3,589,885 40

—The charitable institutions of the city are numerous and very efficient. The Cincinnati hospital, occupying the square bounded by Twelfth street, Central avenue, Ann and Plum streets, is supported by taxation, and has an unpaid medical staff of 14, 6 resident undergraduates, and 68 other employees. In 1872, 3,720 patients were treated, of whom 467 paid for treatment. The daily average of patients was 249. The cost of maintenance was \$90,-114 20. From paying patients was received \$12,070. The Good Samaritan hospital, in Locke street (capacity 250 patients), and St. Mary's hospital in Betts street, are private institutions managed by Roman Catholic sisters. The Jewish hospital, in Baum street, cost \$40,000, and is maintained at a cost of \$8,000 annually by the Jewish hospital association. Longview asylum for the insane in 1872 had 818 patients under treatment, with a daily average of 585, all of whom except 14 were treated without charge. A principal and two assistant physicians and 33 nurses were employed. The expenses for the year were \$103,487. It is said to be the best finished and best appointed asylum in the United States. Its grounds are laid out in lawns, walks, and parks, with greenhouses. There are no bars to the windows, and everything prison-like is avoided. The asylum is supported by Hamilton county, which is set off by the state as a district. The city infirmary in 1872 maintained 635 indoor paupers, at a cost of \$35,197; of outdoor poor it relieved 3,674 with provisions and 5,246 with coal, and furnished coffins and interment to 228, at a cost of \$19,923 39. The Cincinnati orphan asylum, maintained by private charity, with accommodations for 300, cared for 102 children, the German Protestant orphan asylum for 108 children. The colored people sustain an asylum with 40 orphans at Avondale. The Roman Catholics sustain two large orphan asylums, under charge of the sisters of charity, and a protectory, where boys are taught trades, under the Dominican brothers. The widows' home, Mount Auburn, receives indigent women not under 60 years old, and in 1873 had 46 inmates; it has property worth \$55,000, and

\$85,500 endowment and trust funds. The Protestant home of the friendless, and the Roman Catholic house of the guardian angel and convent of the Good Shepherd, are female guardian societies, and, except the last-named, afford temporary protection. In 1872 the home of the friendless received 498 inmates, 57 being infants. The house of the guardian angel is a branch of the convent of the Good Shepherd; it boards about 60 girls, and teaches them trades. Both are under the charge of sisters of the Good Shepherd. The children's home in 1872 cared for 274 neglected children. The house of refuge in Mill creek valley, for children under 16 convicted of minor offences, in 1873 had 228 inmates; it is supported by the city, and managed by a board of directors, at an annual cost of about \$50,000. The city workhouse receives adult criminals convicted of minor offences. It is managed by an unpaid board appointed by the mayor and council. In 1872, 4,011 prisoners were committed, of whom all but 317 were discharged; the average number of prisoners per day was 301; the expenses were \$65,732; the services of prisoners let to contractors yielded \$11,118 50. Secret and mutual benevolent societies are very numerous, especially among the German population. The public schools are under the control of a board of 50 members, elected two from each ward in alternate years, and comprise 25 district, 4 intermediate, and 2 high schools, besides a normal school for females, and evening schools. In addition to the ordinary branches, German, music, drawing, and gymnastics are taught in the day schools. According to the report of the superintendent for the year ending June 30, 1872, of the 120,578 persons between 5 and 21 years of age, 27,617 were registered in the public schools; the average daily attendance was 20,048. The total number of teachers was 510, of whom 406 were females. In the 10 night schools there were 55 teachers and 2,952 pupils enrolled, with an average attendance of 1,410. The expenditures for school purposes for the year ending June 30, 1872, amounted to \$746,027, including \$421,241 for teachers' wages, and \$29,457 for night schools. From an average daily attendance of 18,978 for that year, 11,273 were studying German. The two high schools, known as the Woodward and the Hughes high schools, have a wide reputation for efficiency and a high standard of instruction; in 1873 they had 22 teachers and 805 pupils. The tax for schools in 1872 was 2-75 mills city and 1 mill state levy. Of the \$181,000 raised by the state levy, the city received \$169,000, or \$12,000 less than it paid. There are 106 Roman Catholic parochial schools, with an average attendance of 16,165 pupils. The establishment of a free university, to afford liberal and technical training, is in progress, through the bequest of Charles McMicken, estimated at from \$500,000 to \$750,000. A board of 18 trustees has been organized, under whose auspices the McMicken school of design was

opened in 1869, and in 1873 had 5 instructors and 300 pupils. The telescope and property of the Cincinnati observatory, on Mount Adams, had been transferred to the university, and a site of four acres for a new observatory has been donated at Mount Lookout, near Linwood, 6 m. from the city. The Cincinnati Wesleyan college for females, established in 1842, has preparatory, academic, and collegiate departments, and a department of music and of art. In 1872 there were 17 instructors, of whom 11 were females, and 200 pupils. St. Xavier college, conducted by Jesuits, in 1872 had 317 pupils, of whom 145 were in the academic department, 69 in the collegiate, 69 in the commercial, and 34 in the preparatory; 18 instructors, and a library of 12,000 volumes. The college possesses valuable chemical and philosophical apparatus, a museum, and a large mineralogical and geological collection. The Chickering classical and scientific institute, in George street, between Smith and John, one of the largest private schools for boys in the west, has a classical and a scientific course, each of five years, with 14 instructors and 201 pupils. Lane theological seminary (Presbyterian), occupying a site of seven acres on Walnut Hills, was organized in 1829, and had an endowment fund of \$200,000, and a library of 12,000 volumes. In 1873 there were 5 professors and 38 students in the three classes. The medical college of Ohio, founded in 1819, in 1872 had 10 instructors, 226 pupils, and nearly 2,000 alumni. Cincinnati college has been suspended since 1845, excepting its law school, which, with 5 professors, graduates about 30 students annually. Chief among other institutions are the theological seminary of Mount St. Mary's of the West (Roman Catholic), Mount Auburn, young ladies' institute, Cincinnati college of medicine and surgery, Ohio college of dental surgery, Eclectic medical institute, Miami medical college, organized in 1852, and Pulte medical college (homœopathic), founded in 1872. There are four commercial colleges and two conservatories of music. Cincinnati has 11 public libraries, the most important of which is the so-called public library, occupying an imposing structure in Vine street. It is under the control of a board of seven managers, chosen by the board of education, and is maintained by taxation for the free use of all citizens. The total number of volumes June 30, 1873, was 59,695, the increase during the previous year having been 10,059; 239,487 volumes were taken out by 19,636 persons; average daily circulation, 765. Two large reading rooms on the lower floor are open 14 hours every day in the year, and are supplied with 310 periodicals, including 138 American, 96 English, 60 German, 12 French, 3 Dutch, and 1 Welsh. The reading room, in the third story, is supplied with 42 medical periodicals, and files of 37 current religious newspapers; making, with duplicates, the total number of periodicals received 404, besides 37 newspapers.

The reading rooms were first opened on Sunday from 8 A. M. to 10 P. M., March 12, 1871. The number of Sunday issues for the year ending June 30, 1872, was 19,917. The young men's mercantile library association, founded in 1835, in 1872 had 34,362 volumes and 2,833 members. The increase for the year was 1,282 volumes and 95 active members. The total circulation of books was 59,024. In the reading room may be found 264 magazines and newspapers, of which 45 magazines and 30 newspapers are foreign. The library is open on Sunday. The law library, founded in 1847, contains 7,600 volumes. The mechanics' institute library has 6,500 volumes, and a reading room. The Ohio philosophical and historical society has a library of 4,500 bound volumes, and 12,000 pamphlets and unbound volumes. There are six large musical associations, seven dramatic and reading clubs, and one literary club. The natural history society, recently organized, has a fine cabinet, and the nucleus of a library and a building fund. The historical and philosophical society, organized Dec. 31, 1831, has apartments in College building. Its object is to collect and preserve materials for American history, and it has 87 members. The chamber of commerce, merchants' exchange, an influential and powerful commercial organization, of 1,200 members, meets daily; the board of trade, 850 members, composed of manufacturers; the mechanics' institute, composed largely of machinists, and the pork packers' association, are important organizations. Besides these, nearly every considerable branch of business has its own organization. Under the management of a board appointed by the chamber of commerce, board of trade, and mechanics' institute, three successive industrial expositions have been held yearly, the last in September, 1873. The buildings cover $3\frac{1}{4}$ acres of ground in the heart of the city, and have 7 acres of space for exhibiting. The young men's Christian association occupies a building in Vine street, containing free reading, conversation, and amusement rooms. Daily religious services are held here, and free lectures and concerts are given. Here also are a free employment agency, and a boarding-house directory. In 1872 the total attendance was £6,539. The chief places of public amusement are Pike's opera house, Mozart hall, Robinson's opera house, Hopkins music hall, National theatre, and Wood's theatre. There were 75 newspapers and periodicals published in Cincinnati in 1873, as follows: 9 daily, of which 3 were in German; 1 semi-weekly; 42 weekly, including 4 German; 21 monthly, including 1 German, and 1 quarterly. There are 160 church edifices in the city, distributed as follows: Baptist, 14; Christian, 2; Congregational, 4; Disciples of Christ, 4; Friends, 2; German Evangelical Union, 4; German Reformed, 3; Independent Methodist, 1; Hebrew, 5; Lutheran, 4; Methodist Episcopal, 26; Methodist Protestant, 3; Calvinistic Methodist, 1;

African Methodist, 1; New Jerusalem, 1; Presbyterian, 16; United Presbyterian, 3; Reformed Presbyterian, 3; Protestant Episcopal, 11; Roman Catholic, 32, and 12 chapels; United Brethren in Christ, 3; Universalist, 1; Unitarian, 3; Union Bethel, 1.—Cincinnati was first settled in 1788, by emigrants from New Jersey, on land purchased from the United States government by John Cleves Symmes. Fort Washington was soon built on the crest of the second plateau, between the present Lawrence and Ludlow, and Pearl and Fourth streets. The village was laid out early in 1789 by Col. Israel Ludlow, and was mainly built below the fort, on the river bank. For many years it was composed of frame and log houses. It is said that the name was suggested by Gen. St. Clair, in honor of the Cincinnati society of officers of the revolutionary war, of which he was a member. In 1790 Hamilton county was organized by Gen. St. Clair, with Cincinnati as the county seat. After the victory over the Indians by Gen. Wayne, at the battle of Fallen Timbers, in 1795, which gave peace to the Miami country, immigration rapidly increased, and the growth of the village was steady. Emigrants descended the Ohio river from Fort Duquesne (now Pittsburgh) in flat boats or arks, the journey being attended with great peril from hostile Indians on either shore. In 1794 a line of two keel boats pushed by poles, with bullet-proof covers and port holes, provided with cannon and small arms, was established between Cincinnati and Pittsburgh, making the trip once in four weeks. The keel boat was the best and most comfortable boat for navigation on the Ohio, and this and the flat boat were the sole means of conveyance on the waters of the Ohio and Mississippi. In 1811 the first steamboat was launched in the west, and in 1816 the first steamboat was built in Cincinnati. The steamboat changed the whole kind and character of navigation on the Ohio. Cincinnati at once began to build steamboats, and to trade with the most distant parts of the Mississippi valley. It was incorporated as a city in 1814, and became the mart of a vast commerce, and the point for the receipt, distribution, and transshipment of the immense surplus products of the great region to which she was a centre. Since 1816 the building of river boats has been extensively carried on. During the 25 years ending with December, 1872, 655 steamboats and barges were built, with an aggregate burden of 223,477 tons. The Miami canal was built in 1830, and in 1840 the Little Miami railroad was constructed. In September, 1862, martial law was for a brief period declared in the city, when an attack by confederate troops was expected. The territorial extent of the city, which was formerly about 7 sq. m., has been recently much increased by the following annexations: Feb. 24, 1870, Storrs township, 3 sq. m.; Mount Auburn and Corryville, 1 sq. m.; and Walnut Hills, $\frac{3}{4}$ sq. m.; May 9, Lick Run and Camp

Washington, 5 sq. m.; Pendleton and Spencer township, $2\frac{1}{2}$ sq. m.; Feb. 1, 1873, Columbia village 1 sq. m.; March 18, 1873, Cummins-ville, $2\frac{1}{2}$ sq. m.; March 28, Woodburn, 1 sq. m.

CINCINNATI, Society of the, an association founded by the officers of the American revolutionary army after the peace of 1783. Its object was to commemorate the success of the revolution, and to perpetuate sentiments of patriotism, benevolence, and brotherly love, and the memory of hardships experienced in common. The original draft of its constitution was made by Gen. Knox, and is still extant. The meeting for the organization of the society, held at the quarters of Baron Steuben in New York, on the Hudson river, was composed of the general officers in camp and regimental delegates from the respective lines, the baron presiding as senior officer. Appropriate badges and ornaments were devised, including the eagle and uniting the colors blue and white in compliment to the combined arms through which the revolution had been achieved. The honors of life membership were conferred upon a number of French officers. A fund was formed by the contribution of one month's pay for the relief of members in needy circumstances. The constitution adopted in 1783 declared that the "officers of the American army" associated "themselves into one society of friends, to endure as long as they

shall endure, or any of their eldest male posterity; and in failure thereof, the collateral branches who may be judged worthy of becoming its supporters and members." Jealousy arose against the society, which was supposed thus to be establishing a military order, with the absolute right of inheritance on the principle of the laws of primogeniture. At the first general meeting of the society, held in Philadelphia in May, 1784, a proposition was made to



Badge of the Society of the Cincinnati.

amend the constitution, abolishing all succession of membership, and confining the society to those who had served during the war of the revolution. The amendments then proposed were submitted to the several state societies, but failed to receive their assent, and the constitution as originally adopted remains in force. The right of succession is not absolute, but subject to the judgment of the society that the son, or next in order of descent to a deceased member, is "worthy of becoming a supporter and member;" so that the

law of inheritance confers only the right to be voted for, and the society admits or declines to admit according to its estimate of the character of the eldest male descendant. If he be deemed not worthy, the right is held in abeyance. The impression prevailed in the public at large that the germ of an hereditary aristocracy was concealed within the society, and in some of the states charters were for that reason refused to the branch societies. At the second general meeting, held in 1787, Washington was elected president-general, and was reelected triennially during his life. He was succeeded by Hamilton and the Pinckneys, and the society was in all its vigor during the visit to the United States in 1824-'5 of Lafayette, who was its only surviving major general. The societies of Pennsylvania and Massachusetts had acts of incorporation. The Connecticut society was dissolved in 1804, after a patriotic valedictory by Col. Humphreys. The Delaware society was dissolved about the same time, the more attached of the members carrying their share of the funds into the Pennsylvania society. The New Hampshire, Rhode Island, and Virginia societies continued to exist nearly as long, the first, upon its discontinuance, depositing its records in the state historical society, and the last named appropriating its funds toward the endowment of Washington college. The Georgia society also was discontinued, bequeathing its funds to the parent society. Robert Burnet of New York, who died in 1854, was the last survivor of the original members of the association. It has at present six state branches, which hold annual meetings on the 4th of July, viz., Massachusetts, Maryland, New York, New Jersey, Pennsylvania, and South Carolina. The general society meets triennially, and its conventions have been held successively at Philadelphia, New York, Baltimore, Charleston, Trenton, and Boston. Among the earlier honorary members of the Cincinnati of Pennsylvania were Benjamin Franklin, Sharp Delany, and Robert Morris; among those of New Jersey were Elias Boudinot, William Livingston, and Frederick Frelinghuysen; among those in New York were Chancellor Livingston, Gouverneur Morris, Rufus King, Stephen Van Rensselaer, the naval commanders Bainbridge, Biddle, Stewart, Hull, and Perry, and Generals Jackson, Scott, Brown, Cadwallader, Taylor, Worth, Wool, Grant, and others. The best accounts of the society are in the "North American Review" for October, 1853, and in the "Memoirs of the Pennsylvania Historical Society," vol. vi.

CINCINNATUS, Lucius Quintus, a Roman senator, born about 519 B. C., died after 439. He was a rich patrician, and was occupied with the cultivation of his estates at the time when Terentius Arsa commenced his demands for the enactment of written laws which should be binding upon the patricians and plebeians alike (462). These demands gave rise to great disturbances, and Cæso, son of Cincinnatus,

took an active part in them on the side of the patricians. One Marcus Volscius, a plebeian, testified that Cæso knocked down his brother while he was feeble from sickness, and injured him in such a manner that he died. Upon this evidence Cæso was convicted, and according to Livy Cincinnatus was compelled to pay such a heavy fine on his account that he was ruined. The resistance to the passage of the Terentilian law was kept up by the patricians, and in the course of it Herdonius (460) took possession of the capitol with a band of outlaws and slaves. The citizens attempted to recover possession of it, and in the conflict that resulted the consul, Publius Valerius Publicola, and Cæso were killed. Cincinnatus was appointed consul in the place of Publicola. He was embittered by the loss of his son, and opposed with great violence the enactment of the Terentilian law. When his consulship expired he retired to a small estate beyond the Tiber which belonged to him, and devoted himself to its cultivation. In 459, the patricians then being in the ascendancy, Marcus Volscius was accused of having borne false witness upon the trial of Cæso. In 458 the Æqui and Volsci resumed war against the Romans. Lucius Minucius, the Roman consul, with all his army, was shut up in a defile and hemmed in by the enemy on all sides. Five horsemen broke through, and brought news of what had happened to Rome. It was resolved that Cincinnatus should be created dictator. Messengers were sent by the senate to inform him of his appointment. They found him at work in his field, clad in his tunic. He called his wife, Racilia, and bade her bring him his toga, in order that he might receive the message of the senate clothed in the garb of a Roman citizen. He accepted the office, and made Lucius Tarquinius, a patrician, master of the horse. He raised an army by making a general levy of all the citizens, and marched to the relief of the consul. He surrounded the enemy in turn, so that they were in a ring between the consul's army and his own, and were compelled to capitulate. In this manner Cincinnatus saved the state within 24 hours. Such is the account given by Livy; but Niebuhr and other modern historians have shown that the legend is destitute of truth. While Cincinnatus was dictator, the trial of Marcus Volscius for bearing false witness came on for hearing at the comitia, and Cincinnatus presided over it. Marcus Volscius was compelled to go into exile. In 439 L. Minucius Augurinus, *præfectus annonæ*, charged Spurius Mælius, a rich plebeian knight, with seeking to make himself king. Thereupon Cincinnatus, then 80 years of age, was again appointed dictator. Caius Ahala was appointed master of the horse. The capitol and other strong places were garrisoned by the patricians. Ahala sent an officer to bring Mælius before the dictator, but Mælius kept the officer at bay with a butcher's knife, and took refuge in the crowd. Ahala, at the head

of a band of patricians, rushed into the crowd and killed him. Though the dictator himself had not power to put Mælius to death, but only to bring him before the *comitia centuriata* for trial, Cincinnatus and all the patricians approved of the act. Ahala was however afterward brought to trial, and only escaped condemnation by voluntary exile. At the end of 21 days Cincinnatus retired from the dictatorship and returned to his farm.

CINEAS, a Thessalian, the minister of Pyrrhus, king of Epirus. He possessed great oratorical powers, and Pyrrhus said that his eloquence had won him more cities than his own arms. The most remarkable episode of his life was his being despatched by Pyrrhus to Rome after the battle of Heraclea (280 B. C.), to offer the Romans peace. His wonderful memory enabled him to address all the Roman senators by name; and although the terms which he offered were hard, his persuasive power was so great that he would perhaps have succeeded had he not been defeated by the eloquence of old Appius Claudius the Blind. On his return he told Pyrrhus that the city of Rome was like a temple, the Roman senate an assembly of kings, and that to fight with the Roman people was to fight with the Hydra. In 278 he was again sent to Rome with an offer of more favorable terms, and was successful. He then went as ambassador to Sicily, and is supposed to have died there.

CINGALESE LANGUAGE (more correctly *Sinhalese*), a language spoken in the interior of Ceylon and on its southern coast. The name is derived from Sinhabahu (lion-son) a king of Ladha on the Ganges, whose son Vijaya (Victory) founded the kingdom of Ceylon in the 6th century B. C. This was called Sinhadvipa (lion isle), and by the Chinese Sze-tse-kwō (lion kingdom). The language is a modification of the aboriginal Elu by the Sanskrit, with a slight tinge of Malay, and has many dialects. The language of religion and of learning is the Pali. Deveni Paetissa, the ninth king, becoming a Buddhist, introduced writing in the beginning of the 4th century B. C., and Pali books were brought in under Manamraja, the fifth king of the Sūryya-vansa (Sun dynasty, 5th century A. D.), or earlier. The Cingalese has degenerated so much that there is now a material difference between the vernacular and the written language. The latter is copious, has a regular grammar, and is capable of elegant style, although its pundits disagree in orthography. The graphic system of the Cingalese is the Devanāgarī, but the figures of the letters are serpentine and slender, resembling the Pali. The 50 letters (8 vowels, 8 diphthongs, and 34 consonants) represent only 30 sounds (7 vowels and 23 consonants), because some only occur in Sanskrit words, and some cannot be distinguished by the ear. Our transcription is Italian as to vowels, and English as to consonants, excepting *g*, which is always hard.—There are three genders: mascu-

line nouns end mostly in *a*, plural *o*, *an*, *aru*; feminine in *i*, plural *u*, *varu*; neuter in *a*, *u*, plural adding *val* or dropping the final syllable (thus: *nuvaraval*, cities; *kadu*, swords, from *kaduwa*). The principal masculine and feminine case endings are: genitive, *gē, nē*; dative, *ta, da*; accusative, *va*; ablative, *gen, nen*; there is no *gē, gen* in the plural, but only the other terminations. Neuter endings of both numbers are: *ē, ata, ava*, and *en*, of the above named four cases respectively. Examples: *manuspayā, homo*; *gūnī, mulier*; *oluva, caput*; genitive, *manuspayāgē, hominīs*; *gūnīgē, mulieris*; *oluvaē, capitis*; dative, *manuspayāta, homini*, &c.; accusative, *gūnīva, mulierem*, &c.; ablative, *oluven, capite*, &c., as above detailed; plural, *manuspayo, homines*; *gūniū, mulieres*; *olu, capita*; *manuspayinnē, hominum*, &c., respectively, as pointed out. Adjectives are indeclinable and precede the substantives; thus: *sonda pirimiyā, bonus vir*. Comparative particles are: *bohoma*, much; *vadā*, more; *atī*, most; thus: *vadā naraka*, worse; *atī sudu*, wisest; *sarīrayata vadā sonda prānaya* (body-than more-good soul), *corpore melior anima (est)*. Numerals: *ekay, 1*; *de kay, 2*; *tunay, 3*; *hatary, 4*; *payhay, 5*; *hayay, 6*; *hatay, 7*; *atay, 8*; *nevayay, 9*; *dahayay, 10*; *vissay, 20*; *tihay, 30*, &c.; *siayay, 100*; *dahay, 1,000*. Ordinals: *palamu-veni, 1st*; *de-veni, 2d*; *tun-veni, 3d*, &c., suffixing *veni* to the cardinals, with some alterations. Pronouns personal: *mama, ego*; *mangē, mei*; *mata, mihi*; *māva, me*; *mangen, a me*; *api, nos*; *apagē, nostri*; *apata, nobis*; *apava, nos*; *apagen, nobis*. There are 14 terms in addressing the second person, regulated by the rank both of the speaker and of the person addressed, according to strictest etiquette; for instance, a person of the lowest caste is *to*, masc., *tī*, fem. (thou, you); a son or pupil is *umba*; an equal is *tamunnukhu*, and somewhat respectfully *tamunsē*; a superior is *tamunvahanse*; the highest person is addressed by *etanavahanse*; with other varieties, all equivalent to thou and you, but modified by case and number. The third person is spoken of or pointed out with fewer variations. The verbs are very peculiar; those of the Elu being radical and simple, but those derived from Sanskrit being nouns verbified by certain auxiliaries. Prepositions and postpositions, conjunctions and adverbs are numerous. Nouns and infinitives of verbs are often joined, both receiving a final *t*, thus: *gandat, dendat*, in order to take and to give; or *ut* after consonants, thus: *vachanavalut kriyāvalut*, to become and to act.—The Cingalese literature, being chiefly Buddhistic, has suffered very much from the intolerance of the Brahmans, who speak Tamulic and are Malabars. King Parakramabahu restored the sacred books in 1195, partly by the memory of priests, partly by new composition. Besides their own books, they also translated some scientific Sanskrit Brahmanic works, which they call *Sanna*. There are also versions into Elu

from the Pali, for instance the *Elu Aturāvas*, or comments on Buddha's life and doctrines. The *Bana* are sermons of Buddha. There are very many books on botanical medicine, many on astronomy, some of a rhetorical and poetical character, a few historical and lexicological. The *Rājāvali* (*rājā*, king, and *āvali*, line), a history of the kings of Ceylon, translated by Albert Johnston, Joinville, Davis, and Mahony, and the *Amaracōsha* (*amara*, immortal, and *kōsha*, issue, bud, &c.), or in Cingalese *Amara-sinha* (the author's name), a dictionary, with a copious Cingalese commentary, are Sanskrit works. See also *Singaalsche Taal Konst* (Grammar), by J. Ruell, Amsterdam, 1708; a short grammar by David Wilkins (in the preface to Chamberlayne), who obtained the pronunciation from Pieter Croenenburg; "Dictionary of English-Cingalese and Cingalese-English," by the Rev. B. Clough (2 vols., Colombo, 1821-'30); *Mahavansa*, an epos in Pali, translated by Turnour; *Essai sur le Pali, la langue sacrée de la presqu'île du Gange*, by E. Burnouf and Christian Lassen (Paris, 1826).

CINNA, Lucius Cornelius, a Roman consul, killed at Brundisium in 84 B. C. He was the son of Lucius Cornelius Cinna, who was consul in 127. Although a patrician by birth, he belonged to the party of Marius and the plebeians. When the election for consuls came on at Rome in 88, the power of Sulla was in the ascendancy, and he favored the election of Nonius and Servius Sulpicius. The people nevertheless elected Cinna and Cneius Octavius. One of Cinna's first acts after entering into office was to induce the tribune M. Virgilius to prefer charges against Sulla. But Sulla disregarded them, and went on with his preparations for the Mithridatic war. Before setting out for it he obtained from Cinna a promise that he would not during his absence attempt any change in the constitution. No sooner had Sulla departed, however, than Cinna endeavored to obtain the passage of the Sulpician law for the incorporation among the 35 tribes of those of the allies who had been made Roman citizens. This was a measure which if adopted would have strengthened the power of the plebeians. The consuls resorted to force for the purpose of carrying it through; but they were resisted by Octavius, and after a severe conflict in the forum they were defeated and driven out of the city. The senate passed a decree depriving Cinna of his citizenship and of his office as consul. Cinna appealed to the new citizens of Italy, and organized an army. Marius received intelligence of what had taken place and returned from Africa. Cinna and Marius together prosecuted the war with great energy. The corn ships were captured and the supplies of food destined for Rome were cut off. The senate was obliged to yield, and sent a deputation to Cinna and Marius, inviting them into Rome. Cinna received the deputation with courtesy, sitting in his chair of office, Marius standing by in ominous silence. They after-

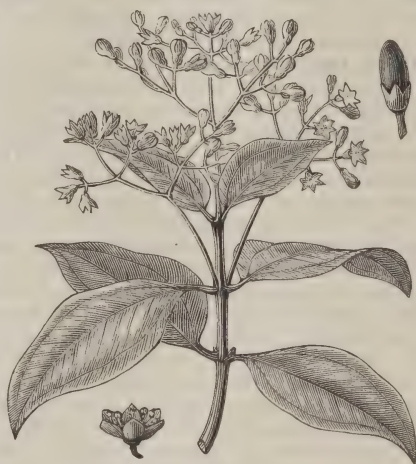
ward entered the city with their guards. Marius showed much greater resentment than Cinna. His guards killed every one they met whom Marius did not salute. Great numbers of the patricians were slain. Marius and Cinna proclaimed themselves consuls for the following year, 86. Eighteen days after the commencement of their term Marius suddenly died of pleurisy, and Cinna chose Lucius Valerius Flaccus as his colleague. Flaccus was sent into Asia to oppose Sulla, and was murdered there. For the year 85 Cinna selected for his colleague Cneius Papirius Carbo. Cinna and Carbo called on the new citizens throughout Italy for men, money, and provisions with which to carry on the war against Sulla. The senate endeavored to stop these proceedings, but though Cinna and Carbo professed to be willing to obey the senate, they in fact went on with their preparations for war, and proclaimed themselves consuls for another year. They resolved to transport an army into Greece and encounter Sulla there, and had embarked one detachment when the soldiers mutinied and Cinna was killed. Cinna at the time had every reason to anticipate success, as he and his colleague were supported by the new citizens, and they had an army very much larger than that with which Sulla a short time afterward landed at Brundisium.

CINNABAR. According to Pliny, this is an Indian name given to a mixture of the blood of the dragon and elephant, and to other substances which produce a similar color. It was afterward applied to the common ore of mercury, the sulphuret, on account of its blood-red color. The ancient Romans were probably acquainted with this ore of mercury, for the mines of Almaden, near Cordova in Spain, which still produce it, are known to have been worked nearly 3,000 years ago; and both Pliny and Vitruvius refer to the ore of mercury in amalgamating gold. The name is also given to an artificial preparation, identical in composition with the ore. Cinnabar consists of 1 atom of mercury, the chemical equivalent of which is 200, and 1 atom of sulphur, 32; or per cent., 86.2 of mercury and 13.8 of sulphur. It forms beds and veins in the upper secondary and older stratified rocks, and is also met with in granite and porphyry. The strata near the veins often contain the ore disseminated through them. It crystallizes in rhombohedral forms, possesses an adamantine lustre, and a brilliant red color, passing from cochineal to ruby red. Its hardness is from 2 to 2.5; its specific gravity is 8.998. It sublimes at a red heat, and without decomposition if protected from the air; and when mixed with iron or lime in retorts, the sulphur is retained and the mercury volatilized. When finely ground, it becomes of a very lively red, and in this condition is known as vermilion. The most important mines of native cinnabar are those of Almaden, already referred to, of New Almaden in California, of Idria in Austria, and of Huanca Velica in Peru.

In Hungary, Bohemia, Bavaria, China, Japan, and Brazil, the ore is also worked.—Artificial cinnabar, from which the greater part of the vermilion used in the arts is prepared, is made by subliming an intimate mixture of 5 or 6 parts of mercury and 1 of sulphur. The mercury is introduced and stirred into melted sulphur. When the mixture becomes thick, combination suddenly takes place, attended with violent crackling and movement of the mass, and evolution of light and heat. The blackish red product is pounded to powder and mixed with a little sulphur. A glass flask half filled with it, and loosely closed with a charcoal stopper, is partially buried in a sand bath, and kept at a red heat for some hours. The excess of sulphur passes out of the flask, and the cinnabar sublimes and condenses in its upper part, leaving the fixed impurities in the bottom. It is then broken up and ground with pure water as finely as possible, and finally dried. The finer the powder is made, the more beautiful is the color. In Idria the process is somewhat different, mercury being thoroughly intermixed with powdered sulphur by placing them together in casks, which are made to revolve. In a few hours a brown powder is produced, which is heated and sublimed in cast-iron vessels. The Chinese have still another process; and their cinnabar is said to incline to a carmine color, while all the European has a yellow tinge. These processes are all in the dry way; but the substance is also prepared in the wet way by the action of the alkaline hydrosulphites upon the black sulphuret of mercury, which is obtained by passing sulphuretted hydrogen through a solution of some mercurial salt. The finest artificial product is obtained by Brunner's process. Mercury, 100 parts, is triturated with 38 parts of sulphur, till the whole is converted into *Æthiops mineral* (a black compound of the two substances). This is placed in a solution consisting of hydrate of potash in 6 parts of water, and kept at a temperature varying little from 45° C., with constant stirring at first. As the water evaporates it is replaced. The red-denning usually begins in about 8 hours. The heat must not then rise above 45° C. When the color is the brightest it is allowed to cool slowly. It is then washed and freed from the metallic mercury. From 109 to 110 parts of cinnabar to 100 of mercury is the product. Vermilion is adulterated with brick dust, oxide of iron, red lead, and dragon's blood. The last is detected by its empyreumatic odor on applying heat; the others by their remaining behind when the pigment is ignited.

CINNAMON, the inner bark of the cinnamon tree (*Laurus cinnamomum*), which appears to have been known at a very early period. The spice obtained from it was used by the Hebrews in their religious ceremonies (Exod. xxx. 23). The Arabian merchants trading between the Red sea and the East are supposed to have carried supplies of it within the range of Phœnician and Grecian commerce. The

tree is a native of Ceylon, where it grows to the height of 20 or 30 ft. It grows also in China and South America. The bark was originally collected from the tree in a natural state, as the Cingalese gave no attention to its cultivation and improvement. Not much was done toward its cultivation until the Dutch came into possession of the island, when, by clearing off the underbrush and weeds, and thoroughly draining the lands, a finer quality of bark was produced. The cinnamon gardens, as they are called, cover an extent of 12,000 acres, the yield ranging between 50 and 500 lbs. per acre. For a long time the Dutch government monopolized the trade in this spice, in which period it was greatly extended. Amsterdam being the sole mart for the product, the supplies sold in that city were immense, averaging from 1692 to 1792 about 320,000 lbs. per annum. After the British came into possession of Ceylon, the cinnamon trade fell



Cinnamon.

into the hands of the East India company, by whom it was monopolized until the year 1833. It was then thrown open, but heavy duties were levied on the exportation. Cinnamon from Java a few years later, as also the cassia from China, coming into competition with the Ceylon spice, the duties have been much reduced, though the last named is superior to any other variety. The soil of Ceylon, being light and sandy, is particularly adapted to this culture. The trees are raised from the seed, and will in six or seven years afford shoots fit for peeling. There are two harvesting seasons in the course of the year: the first and principal crop is procured in May and June, the second in November. Trees two centuries old continue to bear abundantly. The "peelers," as they are called, belong entirely to the Chalia caste, and become by practice very skilful. The bark, after being taken in strips about 40 inches in length from the trees, is collected in bundles for the purpose of fermentation, the

epidermis being easily removed. It is then slowly dried, rolling up in the form of a quill. It is assorted according to its quality into three varieties; the inferior kinds not worth exporting are used in preparing the oil of cinnamon, which is obtained by distillation. The best stick cinnamon is almost as thin as paper, of a light yellowish brown color, and of a sweet aromatic taste. That most esteemed is produced from the late government gardens in Ceylon, which since 1840 have been sold to private capitalists. That least valued comes from the forests.—Cinnamon is used medicinally as an aromatic and moderate astringent. It contains a small quantity of tannin, upon which its astringency depends. Though seldom prescribed alone, it enters into many official preparations. The oil is used in perfumery, pharmacy, and sometimes instead of the spice. Ground cinnamon is frequently adulterated with cassia (which is often substituted for it), and with baked wheat flour, sago meal, or East India arrowroot. The adulteration is not difficult of detection. The Chinese cinnamon, which is the product of the *cinnamomum cassia*, is properly called cassia; but it is often designated by the name of the superior article, and sold as cinnamon. Sometimes it is found little inferior to the real cinnamon.—The imports of cinnamon into Great Britain for 1870 amounted to 2,215,434 lbs., valued at \$1,264,375; for 1871, to 1,584,638 lbs., valued at \$720,730. Of the imports for 1871, 18,512 lbs. were from Egypt, 75,413 from China, 1,430,518 from Ceylon, and 60,195 from other countries. Nearly the entire export from Ceylon is to Great Britain.

CINNAMON STONE, a variety of garnet of a cinnamon brown shade. It is found at numerous localities in the metamorphic rocks in this and other countries. That brought from Ceylon is used in jewelry. (See GARNET.)

CINO DA PISTOJA, an Italian poet and jurist, whose real name was GUITTONCINO or GUITTONE, born at Pistoja in 1270, died there, Dec. 24, 1336. He belonged to the noble Sinibaldi family, and became a judge at Pistoja, whence he fled in 1307, during the conflict between the parties of the white and the black. He was a prominent Guelph, and a friend of Petrarch and of Dante, who often makes complimentary allusions to him. He employed his exile in missions for his party in Lombardy and France, went with the army of the emperor Henry VII. to Rome, and subsequently held an office in Naples. Still later he taught jurisprudence at Treviso, Perugia, and Florence. His first innamorata, Sebraggia, who died soon after he married her, became the theme of his poetry, which ranks next to that of Petrarch. Subsequently he celebrated in song the marchioness Malaspina, whose family is often gratefully referred to by Dante. The most complete collection of the *Rime di Messer Cino*, or *Poesie* (Rome, 1559), was published by Campi in Pisa (1813; new ed., 1826), and the most recent is

by Carducci (Florence, 1864). His commentary on Roman law, *Lectura Cini de Pistoria super Codice* (Pavia, 1483, and Lyons, 1526), passed through many editions.

CINQ-MARS, **Henri Coiffier de Ruzé**, marquis, a favorite of King Louis XIII. of France, born in 1620, beheaded at Lyons, Sept. 12, 1642. His father, the marquis of Effiat, was indebted for his fortune to Cardinal Richelieu, who also chose the son as a companion for the king. The young man ingratiated himself so much into the affections of his sovereign, that he was appointed grand master of the wardrobe and of the horse. He aspired not only to have a share in the government, but also to the hand of the beautiful Maria de Gonzaga, princess of Mantua, who afterward became queen of Poland. The cardinal made light of his pretensions, but Cinq-Mars took offence at this contemptuous treatment and resolved to resent it. In conjunction with several discontented noblemen, he opened negotiations with Spain; but Richelieu succeeded in procuring a copy of their agreement, brought it to the knowledge of the king, and obtained an order for the arrest of his favorite. Cinq-Mars was thrown into prison in company with his youthful friend De Thou, a councillor of the parliament of Paris, and both were sentenced to death, and beheaded at Lyons.

CINQUE PORTS, the five English channel ports of Hastings, Romney, Hythe, Dover, and Sandwich, on the S. E. coast of England, to which were afterward added the towns of Winchelsea and Rye. These ports, lying opposite to France, received peculiar privileges in the early days of English history, on condition of providing in time of war a certain number of ships at their own expense. According to Camden, the first warden was appointed by William the Conqueror; but their charters are traced to the times of Edward the Confessor. They are governed by an officer called the lord warden of the cinque ports. Formerly each of them sent two members to parliament, under the title of barons of the cinque ports; but since 1831 this privilege has been restricted to Hastings, Dover, and Sandwich. The duke of Wellington was lord warden of the cinque ports, and died at the official residence, Walmer castle.

CINTRA, a town of Portugal, in the province of Estremadura, on the edge of a granitic sierra, which forms a continuation of the Estrella range, 15 m. W. N. W. of Lisbon; pop. about 3,000. It is a place of resort for the wealthy inhabitants of the capital, and for English and other foreigners, whose villas are scattered over the neighboring slopes, and stud the beautiful valley of Collares, west of the town. Fruits of every description abound in the surrounding country; the climate is mild and pleasant; and the scenery, though perhaps surpassed in other parts of Portugal, has been made famous by Byron's glowing description of it in "Childe Harold." The kings of Por-

tugal have a palace here, which was formerly the residence of the Moorish monarchs. In it Alfonso V. was born and died, and Alfonso VI. was confined during the last eight years of his life. On the summit of one of the highest peaks of the sierra is the Penha convent, built by Emanuel the Great, and restored and beautified for use as a palace by the ex-king Ferdinand. There is another convent built for the reformed Franciscans by De Castro, and called the "convent of cork," from the circumstance of the cells being lined with that substance. It is partly hollowed out of the rock. The residence of De Castro, and a chapel built by him after his return from India in 1542, are shown to visitors. In the vicinity of the town are quarries of beautiful marble. On Aug. 30, 1808, a convention was concluded here by the English commander, Sir Hugh Dalrymple, with Gen. Junot, after the defeat of the French at

as the initials of a name engraved upon carriages, furniture, plate, seals, or tombs, which it was formerly the custom of tradesmen and citizens to display, much as a coat of arms was displayed by the nobility; also to the monogram or conventional figure by which some artists have designated their names upon their works.—It is also the name of any disguised method of writing, designed to be understood only by the persons who have especially agreed upon the significance of the characters employed. The oldest example of this is the Spartan *scytale*. When the general of the army departed on any expedition, he took a round wooden staff, called a *scytale*, with him, leaving another exactly like it with the ephors. When the latter had any communication to make to him, they wound a slip of parchment around the staff, and on this wrote the message. Being unrolled, only detached and fragmentary



The Penha Convent.

Vimieiro, under which they were not only permitted to leave Portugal, but were conveyed to France with their arms and property.

CIONE, *Andrea di*. See ORCAGNA.

CLOTAT, *La*, a seaport town of France, in the department of Bouche-du-Rhône, on the railway from Marseilles to Toulon, 14 m. S. E. of Marseilles; pop. in 1866, 10,017. The port is accessible to vessels of 300 tons. It has a large parish church, a fine public promenade, a steam engine factory, considerable ship building, and an extensive coasting trade.

CIPHER (Arab. *sifr*, empty), one of the ten characters used in the notation of numbers by the Arabic system. When it stands by itself it signifies zero. Each cipher placed at the right of a significant figure representing a whole number increases its value tenfold. In decimal fractions every cipher that is placed before a significant figure reduces it to one tenth its previous value.—The term is also used for an enigmatical intertexture of letters,

letters appeared; but when sent to the general he was able to put it in position upon his staff and read it. The art of secret writing in modern times was long regarded as a branch of magic. When the abbot Trithemius published a treatise on it about 1500, the elector palatine caused a copy of it to be burned, as containing diabolic mysteries. More recent writers on the subject are Giambattista Porta, Vigenère, J. P. Nicéron, Klüber (Tübingen, 1809), and Martens (Leipsic, 1851). The chief use of cipher writing since the time of Richelieu has been in

diplomatic correspondence, employing various methods, by figures, letters, and catchwords. The introduction of the electric telegraph in recent times has also given occasion for the use of commercial ciphers, by which merchants and bankers transact distant affairs without betraying their secrets.

CIRCARS, *Northern*, an old division of the presidency of Madras, British India, on the E. coast of the peninsula, between lat. 15° 40' and 20° 17' N., and lon. 79° 12' and 85° 20' E., bounded N. and W. by Orissa, S. by the Carnatic, and E. by the bay of Bengal; area, 23,750 sq. m.; pop. about 3,000,000. The division formerly comprised five districts, called circars, viz.: Cicacole, Rajahmundry, Ellore, Condapilly, and Guntoor, the territory embraced in which was afterward distributed among the British districts of Guntoor, Masulipatam, Rajahmundry, Vizagapatam, and Ganjam. A range of mountains runs along the W. frontier, supporting a growth of valuable

teak and other timber, and leaving between their base and the coast a fertile tract of 30 or 40 m. average breadth, in which grain and a superior kind of tobacco are produced abundantly. Sugar, ginger, turmeric, and cotton are also cultivated; but fruits and green esculents are scarce. Sheep and the larger species of horned cattle are the principal quadrupeds. Ship building is carried on in the Godavery river; the coasting trade with Madras and other ports employs a large number of native vessels; cotton stuffs, chintzes, carpets, punjum cloths, muslin, silks, and indigo are manufactured; and fine cotton fabrics are exported to England. The native inhabitants are almost without exception Hindoos, and as a class are thought to be superior to the Bengalese. Their villages are little better than collections of large mud huts. Four of the Circars were acquired from the emperor Shah Alum, who bestowed them upon the East India company as a free gift in 1765; Guntoor, the fifth, passed into British hands in 1788.

CIRCASSIA (properly **TCHERKESSIA**; called by the Circassians the land of the Adighei), a mountainous region of European Russia, forming a part of the Kuban district, between lat. $42^{\circ} 40'$ and $45^{\circ} 20'$ N., and lon. $37^{\circ} 30'$ and $42^{\circ} 30'$ E.; area, about 20,000 sq. m.; pop. about 300,000. It is situated on the N. E. part of the Black sea to about lon. $42^{\circ} 30'$ E. On the N. it is separated from the territory of the Black sea Cossacks by the river Kuban, and on the N. E. by its affluent, the Laba, from the Nogai lowlands; on the S. E. it borders on the Greater Kabarda; and on the S. and S. W. it is separated from Imerethia, Mingrelia, and Abkhazia by the highest chain of the Caucasus. The whole of this country, with the exception of the low lands on the Kuban, is rugged and mountainous, embracing the Elburz and other peaks of the Caucasus, and is everywhere broken into deep valleys and intersected by streams. Toward the N. W. the mountains gradually decrease in elevation, and the range of the Black mountains (anc. *Coraxici Montes*), between the Black sea and the Kuban, consists of a number of rounded hills of moderate height. From the contiguity of the mountains to the sea the watercourses are generally of small importance, most of the rivers being but shallow streams, which in summer stagnate on the low grounds and produce miasma. In the more elevated portions the atmosphere is colder and the climate is more salubrious. The hydrography is of two systems, the waters of the S. E. district being conveyed by the Terek to the Caspian sea, and those of all other parts by the Kuban or directly to the Black sea. Some of the direct affluents of the Black sea are of sufficient depth at their mouths for navigation. For the prevention of smuggling and of the traffic in slaves, the Russians have built a number of forts on the coast. On the Kuban is also a line of forts to keep the tribes in subjection. The passes leading through the

mountains are narrow defiles, which can be traversed only in single file. The villages are generally situated in the valleys which are most difficult of access.—The name Tcherkesses, “cutters of roads,” a term equivalent to cutpurses or highway robbers, was given by the Tartars; the Circassians call themselves Adighei, “the noble.” They are essentially a pastoral as well as a warlike people, averse to labor, and addicted to robbery and bloodshed. They are of middle stature, with broad shoulders, but otherwise slender, having small hands and feet, and keen eyes. Their bearing is courteous and dignified. Their wealth consists in flocks, herds, horses, and arms. Money as a circulating medium is almost unknown. According to their eulogists, the Circassians are the handsomest, bravest, and noblest of mankind; but their detractors represent them as a semi-barbarous horde of marauders. They do not



Circassians.

even constitute one people, but are composed of clans, subdivided into families more or less powerful, under their hereditary heads, who in turn are feudatory to the princes or greater chiefs, also hereditary, but liable to be deposed for misconduct. Circassian pride of birth is excessive, and causes society to be divided into classes as strictly defined as in the most aristocratic countries. With all this they have a theory of republicanism, every free Circassian having a right to make his voice heard in the public assemblies. The social grades are: 1, princes or chiefs, called *pshehs*, *khanuks*, *khans*; 2, nobles; 3, middle class; 4, retainers; 5, serfs, employed either in cultivation of the soil or in menial service. The princes and nobles are the owners of the soil, from whom their tenantry hold the land which they cultivate. The noble lives in his village, surrounded by his people, and exercises a patri-

archal jurisdiction, regulating even their marriages and the education of their children. Having no written laws, the administration of justice was formerly regulated by custom and tradition, and ordinary affairs were administered by a council of the oldest and most respected of the villagers, whose award was final. All ranks associate, and are clothed, fed, and housed alike, the only difference being in their warlike equipment, wherein the rich men display great extravagance; the array of a chief consists of a coat and helmet of mail, sword, javelin, rifle, pistols, poniard, and frequently bow and arrows. The chiefs alone are entitled to the privilege of wearing red. Like most oriental nations, they shave the head, and never remove the head covering. The ordinary costume consists of a tunic descending to the knee, secured around the waist by a leather belt, and having on both sides of the breast from 12 to 20 small pockets in which cartridges are carried, a round fur cap, and cloth trousers of eastern pattern. On a journey a goat's-hair cloak with a hood is added. Their habitations are log huts, put together slightly, so as to be abandoned at short notice. Around these cabins they cultivate millet, barley, and vegetables for their own food, permitting their flocks to pasture among the hills. The Circassian national dish is millet porridge; they also distil a kind of whiskey from millet. Bees are reared on most farms, and mead is a favorite beverage. Great attention is paid to the breeding of horses. Oxen are employed in agriculture. Mules and asses are the beasts of burden, the horse being considered too noble an animal for labor. There is no regular taxation, the lower orders being required to supply what the nobles want; but the vassal who finds the exactions of his lord too severe can transfer his allegiance to another. Some of their domestic customs are curious. A bridegroom makes a show of carrying off his bride by force from her father's house. The Circassian husband has unlimited power over the lives of his wife and children. The wife hides herself from strangers, and the children must stand in his presence. Polygamy is allowed, but custom limits men to one or at most two wives. The women have fine forms and complexion, both of which are carefully preserved by exemption from labor and by attention to diet and cosmetics. The household work is done by the married women. The traffic in their daughters has been the greatest reproach against the Circassians. About 1,000 girls were formerly exported annually. The Russians stopped the trade, but by treaty in 1845 its renewal was permitted. Lady Sheil, in her "Glimpses of Life and Manners in Persia" (London, 1856), gives an interesting account of the slave trade as she saw it in 1849. Dealers from Constantinople and Egypt made voyages to Circassia, taking with them silk and cotton cloths, chintzes, shawls, colored leather, gunpowder, and salt, which they exchanged for females and youths. Ugly and old females were taken for

menial service, and the handsome girls for the harems. Men could not sell their daughters against their consent, but it was the great ambition of a Circassian girl to become an inmate of the harem of a wealthy Turk. Sometimes a man induced his friend to sell him, then took flight, and the amount of the purchase was divided between them. The price of males varied from \$50 to \$400, that of females from \$50 to \$700, according to age and beauty. The traffic was again suppressed in 1855 by the firman of Abdul-Medjid, which prohibited the sale of white persons as slaves. Notwithstanding the prohibition, however, there was in 1856 an absolute glut in the Circassian slave market at Constantinople, and a Circassian girl, formerly thought very cheap at \$500, might then have been had for \$25. The Circassians are fond of music; their instruments are chiefly a shepherd's flute and one resembling a violin, with but two strings. There are wandering poets, and every chief has his own bard. The sexes do not dance together; the young men form a circle, into which one steps and goes through a round of comic leaps and gestures, the others keeping time by clapping their hands. The dance of the girls is similar, but performed with more grace. The Circassians unite into brotherhoods, consisting of 20 or more families, who bind themselves to assist each other in cases of need, and a widow of one is provided for by the whole brotherhood. The religion is a mixture of Mohammedanism, Christianity, and paganism. Nominally they follow the precepts of the Koran, but pay a superstitious reverence to the sign of the cross, while the bulk of the people believe in a good spirit called Merem, and an evil, Tchible, the god of thunder; also Tleps, the god of fire, and Sesserer, of water and winds, and protector of cattle. They have no mosque, but there are sacred groves and mountains where they resort for prayer. Their mollahs or priests are much revered.—The different tribes have a striking similarity in habits and customs, but differ widely in language. Within a narrow space it is said that no fewer than 72 dialects have been counted, and one particular region was named by Abulfeda *Jebel el-Ulsun*, the mountain of languages. The language is harsh, abounding in gutturals, and bears little resemblance to any other, except that there are a few words resembling those of the Finnish. Nouns have seven cases, but no gender; the plural is formed by the addition of *khe* or *her*. An *r* affixed to a word serves as an article. The comparative is formed by *nakhai* placed before the adjective, and the superlative by the affix *ded*, or the prefixes *kodo*, *bo*, *bodedo*. The numerals are: *tze*, 1; *tuu*, 2; *sshe*, 3; *pléa*, 4; *tfö*, 5; *khkhö*, 6; *ble*, 7; *üye*, 8; *vgu*, 9; *pse*, 10. The personal pronouns are: *serö*, I; *vuore*, thou; *ié*, *ar*, he; *teré*, we; *suoré*, you; *a*, *arikh*, they. Five conjugations have been distinguished in the verb, and the different tenses and moods are expressed by the ter-

minations, as *sé slauguo*, I see; *s'slauguge*, I saw; *s'slauguaga*, I have seen; *s'slauguno sé shite*, I shall see; *slauguner*, to see.—The early history of Circassia is little known, especially that of the eastern part. The people appear in history under different names, as the Zyges of Strabo, the Zuchi of Adrian, the Cercetæ of Pliny, and the Siraks in the middle ages. Conquered by Mithridates, the country passed on his overthrow into the hands of the Romans, under the name of Zichia; but the sovereignty of the emperors was merely nominal. In the 5th century it was subjugated by the Huns, and later by the Khazars. In the 9th century the Circassians made a fruitless effort to regain their independence; after which they separated into two bands, one going to the south of the Caucasus, near Persia, then occupied by the Arabs; the other to the lower Don, whence they subsequently returned. After the overthrow of the empire of the Khazars, Circassia became subject first to the Seljuks, and then to Georgia, whose queen, Tamar, is said to have introduced Christianity. In the early part of the 13th century it was conquered by the Mongols under Batu Khan; and at the end of the 14th it was devastated by Tamerlane, who compelled the people to embrace Islamism. In the 16th century the khans of the Crimea, as successors of the Mongol emperors, claimed the sovereignty over Circassia; but in 1560 the czar Ivan Vasilevitch, who had married the daughter of a Circassian prince, sent an army to the assistance of his father-in-law. After Ivan's death the Circassians submitted to the khans of the Crimea; but in consequence of the exactions and outrages of the Tartar officials, they revolted about 1705, massacred the tax collectors, defeated a Tartar army sent against them, and made an alliance with the Turkish sultan. By the peace of Belgrade (1739) the Circassians were declared independent. In 1781 Russia acquired the Kuban border, and in 1784 the Turks built the fortress of Anapa, and thence stirred up the Circassians against Russia. Anapa was captured by the Russians in 1807, but was restored to the Turks at the peace of Bucharest in 1812. The Turks availed themselves of the quiet which followed to convert the Circassians to Islamism. In 1829 Anapa again fell into the hands of Russia, which by the treaty of Adrianople, of the same year, also acquired all the Turkish possessions on the coast. The Circassians refused to recognize the cession of their country by the Turks, and began the obstinate struggle for independence which made their name famous, and in which they were joined by the Lesghians, Tchetchentches, and others, succumbing, however, in the end. In 1856 a Circassian deputation was sent to Constantinople to implore Turkish protection. In 1862 a deputation arrived at London, and presented to the queen a memorial protesting against the action of Russia and the authority of Turkey to cede their country. During a visit of the

emperor Alexander II. to the Caucasus in 1863, he was waited upon by a delegation of Circassians, who asked to be left in possession of their territory, promising to live on terms of peace and amity with the Russians. The emperor refused to accede to their request, and offered them the alternative between emigration beyond the Kuban and a continuation of hostilities. They chose the latter; but being unable to resist the superior strength and discipline of the Russians, in the following year there was a great emigration of about 200,000 persons into Turkey. The Russian government sent vessels to transport them, and furnished them with provisions as long as they were on the Russian shore. (See CAUCASUS.)

CIRCE, in Greek mythology, a sorceress, daughter of Helios and Perse, and married to a prince of Colchis, whom she murdered. Expelled by his subjects, she was transported by her father to the island of *Ææa*, off the coast of Italy, where she was sojourning when Ulysses touched there. While the hero continued in his ship, he sent some of his followers to pay their respects to the sovereign of *Ææa*, and to solicit refreshments for himself and his crew. Circe received them with apparent hospitality, causing food and wine to be set before them. All ate and drank freely save Eurylochus, and all save he were presently metamorphosed into swine. Eurylochus returned to the ship, and reported to Ulysses what had befallen his companions. Ulysses, who had been rendered proof against enchantment by an herb which he had received from Mercury, hastened to the palace of Circe sword in hand, and compelled the sorceress to restore his followers to their former state. She fell in love with Ulysses, who lived one whole year with her, and she bore him two sons. Before Ulysses left her, Circe recommended him to descend into Hades and consult Tiresias, the seer, in regard to the future. Upon his return from his visit to Tiresias, Circe received him and his followers kindly, explained to them how to avoid the dangers that were before them, and then dismissed them.

CIRCEII, an ancient city of Latium, situated at the N. foot of Mons Circeius (now the mountain promontory Circello), near the sea, 55 m. S. E. of Rome. It was colonized by the Romans in the reign of Tarquin the Proud, who deemed its situation advantageous for commerce, and also wished to make it a bulwark against the Volscians. It is mentioned among the conquests of Coriolanus, and soon after fell into the hands of the Volscians, but was reconquered by the Romans. Circeii subsequently revolted from Rome, joined the Volscians, succeeded in establishing its independence, appeared as one of the cities of the Latin league at the outbreak of the great Latin war in 340 B. C., and furnished one of the two prætors who commanded the whole nation. It appears again among the 30 Latin colonies in the second Punic war, but from

this time seems to have declined, and to have become gradually insignificant. It was subsequently, under the later republic and the empire, a favorite place of retirement for wealthy Romans, having a peculiar attraction in the abundance and excellence of its oysters. It was sometimes selected as a place of exile, and the triumvir Lepidus was banished hither. Its ruins are still to be seen on the Monte della Cittadella, about 2 m. from the sea. The remains of its walls, constructed of polygonal blocks, show a massive style of architecture.

CIRCENSIAN GAMES, the various combats and contests exhibited in the Roman circus, said to have been first instituted by Romulus for the purpose of attracting the Sabines to his new town. A part of them were abolished by Constantine, others by the Goths; but the chariot races continued at Constantinople till the siege of that city by the Venetians in 1204.

CIRCLE, a plane figure bounded by a line every part of which is equally distant from its centre. This line is called the circumference, and in popular language the word circle is sometimes used for circumference. The diameter of a circle is a straight line which passes through its centre and is terminated at both ends by the circumference. The ratio of the diameter to the circumference was shown by Archimedes to be about as 7 to 22, and by Metius as still more nearly 113 to 355, which, though slightly too small, is as accurate as is needed for practical use. The exact ratio cannot be expressed in numbers, although many algebraic expressions can be obtained for it, of which we will give but one. If the number 4 be divided by 1, 5, 9, 13, and every 4th number in succession, and afterward by 3, 7, 11, and every 4th number in succession, the difference between the sum of the first set of quotients and that of the second set will be equal to this ratio; or approximately in decimals, 3·14159265. The ratio of 7 to 22, decimally expressed, is 3·14285714; that of 113 to 355 is 3·14159292.

CIRCLEVILLE, a city, capital of Pickaway co., Ohio, on the left bank of the Scioto river, and on the Ohio canal, which here crosses the river by a handsome aqueduct, 25 m. S. of Columbus; pop. in 1870, 5,407. It occupies the site of an aboriginal fortification of circular form, from which its name is derived. The surrounding country is rich and highly cultivated. The Cincinnati and Muskingum Valley railroad passes through it. It contains numerous mills and factories, and three weekly newspapers. There are 18 schools, of which 2 are high schools, 19 teachers, and 728 male and 688 female pupils in attendance.

CIRCUITS (Lat. *circuitus*, from *circumire*, to go around), the periodical progress of the several judges of the superior courts of the common law in England and Wales through the several counties for the purpose of administering justice. The term is also applied to the several divisions of the kingdom which are made for

the purposes of these visits, and through each of which one of the judges will go in order to hold courts twice or more each year in every county. The United States is also divided into circuits similarly, and the justices of the supreme court and circuit judges go upon the circuits periodically in like manner. There are like divisions of the several states for judicial purposes, and in some these are called circuits, in others not. (See COURT.)

CIRCULAR MEASURE, a measure of angles produced by dividing the circumference of a circle, with its centre at the vertex of the angle, into 360 equal parts called degrees. Each degree is also divided into 60 minutes, and each minute into 60 seconds. Circular minutes and seconds are marked by accents (' and "), while measures of time of the same name are marked *m.* and *s.*

CIRCULATING MEDIUM. See MONEY.

CIRCULATION. Under this title we shall examine only the circulation of blood in the animal economy, omitting all that relates to the circulation of lymph and chyle, and to the circulation of the nutritive fluids in plants. Before stating by what decisive experiments and reasonings the eminent William Harvey (1619, 1628) proved the circulation of the blood, we must remind the reader of some points in the anatomy of man and of the higher animals which are essential to the understanding of our subject. The heart, which is at least one of the principal organs that circulate the blood, is a complicated muscular apparatus, composed of walls separating four cavities, two on the left and two on the right of the organ. Although there is only a muscular wall between these two sets of cavities, and although they belong to one single organ or apparatus, the two sides of the heart, in which are these two sets of cavities, are sometimes called, for the sake of brevity, the right heart and the left heart. Of the four cavities of the heart and of their walls, two, the upper ones, are called the auricles, while the two lower ones are called the ventricles; so that there is a left auricle and a left ventricle, constituting the left heart, and a right auricle and a right ventricle, constituting the right heart. The circulation of the blood takes place in the following way: From all the parts of the body black blood, called also venous blood because it comes by the veins, reaches the right auricle, which propels it into the right ventricle, from which it is sent to the organs of respiration, *i. e.*, the lungs. The blood vessel that brings the blood from the right ventricle into the lungs is the pulmonary artery. The lungs send back this blood to the heart through blood vessels which, on account of their structural resemblance to veins, although they do not carry black or venous blood, are called pulmonary veins. In the lungs the blood by the influence of respiration becomes red, and in consequence the heart receives red blood from the pulmonary veins. The left auricle is the place of reception for

this blood, which is thence carried into the left ventricle. By a large blood vessel called the aorta the blood expelled from the left ventricle passes into the arterial system, and is thence distributed to all the parts of the body. So that, as may be now easily understood, there is apparently a double circulation, one through the whole body, and one through the lungs and the heart. The blood from all parts of the body comes to the heart through the veins; it passes from the trunks of these vessels, the *venæ cavæ*, into the right auricle, thence into the right ventricle, which sends it to the lungs through the pulmonary artery; thence it returns to the heart by the pulmonary veins, and enters the left auricle, which impels it into the left ventricle, from which it goes to the whole body through the aorta and its ramifications, the various arteries; finally, from the arteries it passes into the veins through the very minute blood vessels called capillaries. In writing the names of the parts through which the blood circulates, we may begin with either, as these parts form a circuit; thus:

10. General capillaries.

- | | |
|----------------------------------|---------------------------|
| 1. Veins. | 9. Aorta and arteries. |
| Right heart. { 2. Right auricle. | 8. Left ventricle. { Left |
| 3. Right ventricle. | 7. Left auricle. } heart. |
| 4. Pulmonary artery | 6. Pulmonary veins. |
| 5. Capillaries of the lungs. | |

If, instead of beginning with number 1, we begin with number 7, the blood then passes from 7 to 8, to 9, to 10, to 1, to 2, to 3, to 4, to 5, to 6, and thence reaches again number 7. The principal facts discovered or clearly proved for the first time by Harvey are: 1, that the movements of the heart are similar to those of the muscles of the limbs, &c., as regards the parts which produce them; 2, that the arteries become full at the time the ventricles of the heart expel the blood they contain; 3, that the pulmonary artery receives blood at the same time the aorta and other arteries receive it, and therefore that the two ventricles contract and expel the blood at the same time; 4, that the two auricles contract simultaneously, and that their contraction precedes that of the two ventricles; 5, that after a ligature has been applied on an artery this vessel becomes quite distended with blood between the ligature and the heart, and empty in the other parts, showing that the blood comes from the heart into the arteries; 6, that after the application of a ligature on a vein the blood disappears above the ligature, *i. e.*, in the direction toward the heart, while it accumulates in the vein below the ligature, *i. e.*, in the part which seems to be separated from the heart; 7, that the valves in the veins prevent the blood from going in a wrong direction. From these facts and the natural conclusions that may be drawn from them, and also from many other facts and reasonings, Harvey deduced the theory of the circulation of the blood, which we have stated, and which is now universally admitted. Harvey, in giving

this complete demonstration of the circulation of the blood, achieved the most important discovery yet made in physiology.—We pass now to the examination of the most interesting questions concerning the circulation of the blood, omitting all those relating to the frequency, strength, and causes of the movements of the heart, for which see HEART and PULSE. There are four principal members or parts of the circulatory apparatus, each of which has a special office to perform in the function as a whole. These are: 1, the heart; 2, the arteries; 3, the capillaries; and 4, the veins. We shall describe the action of these different organs or groups of organs in succession.—The heart is the main cause of the movement of the blood in the circulation. It is, as Harvey first demonstrated, a muscular organ, which contracts upon the blood contained in its cavities and drives it out into the arterial trunks, exactly like an animated force pump. The left ventricle, which is by far the thickest and strongest of all the chambers of the heart, nearly empties itself at each contraction, and the blood, being prevented from regurgitating into the auricle by the shutting back of the ventricular valves, is forced onward by a vigorous impulse into the aorta. The elastic resistance of the arterial system, being inferior in force to the muscular contraction of the heart, yields before it, and the blood which previously filled the left ventricle is thus suddenly transferred to the cavity of the aorta. The contraction of the heart is then at once followed by a condition of relaxation, and the ventricle begins to be again passively filled by the blood flowing into it from behind, from the veins and through the auricle. Thus the circulation through the heart is intermittent. The blood is at one instant driven out of the ventricle in a powerful stream, and is then temporarily arrested until another muscular contraction takes place, to repeat the same phenomenon.—*Movement of the blood in the arteries.* The most marked physical property of the arteries, as a whole, is their elasticity. In this respect they are like a series of India-rubber tubes, owing to the abundant development of elastic fibres in their middle coat. Accordingly they are distensible, but offer nevertheless a certain amount of resistance to any distending force. This resistance, as we have remarked above, being less than the impulse with which the blood is injected into them from the heart, the arteries expand at the instant of the heart's contraction, and are thus made to contain a larger quantity of blood than before. This expansion of the arteries under the heart's action, which is nearly simultaneous all over the body, can easily be perceived by the finger placed above an artery of moderate size, and is known as the arterial pulse. As each stroke of the pulse is caused by and is synchronous with a cardiac pulsation, its frequency becomes a valuable and convenient means by which the

physician estimates the rapidity of the heart's action. As soon, however, as the cardiac contraction which caused the dilatation of the arteries comes to an end and is followed by relaxation, then the elastic reaction of the arteries themselves, compressing the blood, drives it onward toward their terminal ramifications and into the capillary system. Under these circumstances the blood would be partly forced backward into the relaxed ventricle, were it not for three thin but strong membranous valves which guard the orifice of the aorta at its junction with the heart, and which shut backward at the instant of the heart's relaxation, and thus prevent any backward regurgitation. Thus the blood, forced into the arteries by the muscular power of the heart, is driven onward to the capillaries by the elastic force of the arteries themselves. Nevertheless the heart is the essential cause even of the arterial circulation; for the elasticity of the arteries, which is a passive physical property, like that of India rubber, is called into exercise only by the distention of these vessels under the cardiac impulse; and the blood would soon cease flowing were it not, at each successive contraction of the ventricles, thrown into the arterial system in superabundant quantity. The arterial circulation, carried on under the combined influence of the two forces just described, presents certain peculiarities which are worthy of notice. First, its rapidity varies at different periods during a single pulsation. At the instant of the heart's contraction the blood moves with a maximum velocity; in the intervals of the heart's action, when it is compressed by the arterial elasticity alone, its velocity is diminished. Consequently, if an artery of medium size be wounded, the blood escapes from it in jets. At each cardiac pulsation the stream of blood rises and flows more rapidly; at each relaxation it falls to a lower level and runs more slowly. The stream is never entirely interrupted. On the contrary, it flows always with a considerable degree of force; but its increased velocity at each period of the heart's action is abundantly visible. It is this pulsatile character of the hæmorrhage from arteries, as well as the florid color of the arterial blood, which enables us at once to distinguish it from hæmorrhage which takes place from veins or capillaries. Chauveau has succeeded in measuring these variations of rapidity in the arterial circulation, by an ingenious instrument adapted to the carotid artery of the horse. He finds that at the instant of the heart's contraction the blood is suddenly put in motion with a comparatively high degree of rapidity, amounting on the average to 20 inches per second; the movement of the blood is then diminished or brought to a standstill immediately before the closure of the aortic valves; on the closure of the valves the blood again moves forward with a velocity of about $8\frac{1}{2}$ inches per second; and it then diminishes gradually, falling to a

little less than 6 inches per second by the end of the period of relaxation. Secondly, the difference between the two conditions of distention and collapse of the artery diminishes from the heart outward; for at a distance from the heart the force of the cardiac pulsation has been partly expended in distending the larger vessels in its neighborhood, and consequently the distention of the remote artery is less; and at the time of cardiac relaxation the smaller artery is still kept partly distended by the elastic reaction of the larger ones behind. Thus, as in the case of water driven by the strokes of a force pump through an elastic air chamber, the intermittent action of the heart upon the blood becomes more and more equalized, from the centre of the circulation outward; and in the smallest arterial ramifications the pulsating character of the flow is hardly visible to the naked eye, though still perceptible under the microscope. The pressure exerted upon the blood in the arterial system may be measured by attaching the carotid artery of the living animal to a reservoir of mercury provided with an upright open tube or pressure gauge. When the cavity of the artery is allowed to communicate freely with the interior of the reservoir, the mercury, under the pressure of the blood, rises in the upright tube, and the height of the mercurial column thus becomes an indication of the pressure to which the blood itself is subjected within the artery. The arterial pressure, measured by this test, is found to equal on the average a column of mercury 150 millimetres (6 inches) in height. Various oscillations of the level of the mercury show the variations in pressure upon the blood during the different periods of a pulsation; but in the healthy condition it seldom or never falls below 130 millimetres.—*Movement of the blood in the capillaries.* In the capillary vessels the movement of the blood at once loses all trace of the pulsating character which it presented in the arteries, and becomes perfectly steady and uniform. This is because, on leaving the arteries and passing into the minute and excessively abundant capillary vessels, the same quantity of blood at once becomes subjected to the influence of a much greater extent of elastic surface; for the walls of the capillaries are themselves elastic, and the substance of the organs in which they ramify has also to a greater or less degree the same property. The effect of this increased elasticity of the surrounding parts upon a given quantity of blood is to equalize its rate of movement, and convert it into that of a completely uniform current. Nevertheless, the physical cause of the passage of the blood through the capillary vessels is simply the pressure from behind to which it is subjected in the arterial system. This is fully evident from the following considerations: If the nozzle of an injection pipe be placed in the femoral artery of a recently killed animal, and liquid blood be forced by it through the terminal ramifications of the artery and the capillary

vessels of the limb, so as to return in a full stream by the femoral vein, it is found that the force requisite to accomplish this result, as measured by a pressure gauge connected with the syringe, is from 120 to 130 millimetres of mercury. Prof. Sharpey of London found that an injection might be made to pass in this way from the mesenteric artery through both the two successive capillary systems of the intestine and the liver, and return in a full stream by the vena cava, under the pressure of a column of mercury 130 millimetres in height. But we have already shown that the blood is habitually subjected in the arteries of the living animal to an average pressure of 150 millimetres. This force accordingly is amply sufficient to account for the movement of the blood through the capillaries generally, from the arteries to the veins. The rapidity of movement of the blood in the capillaries is much less than in the arteries. This is due to the fact that the extent of vascular surface with which the blood comes in contact on entering the capillary system is vastly increased owing to the small size and great number of the vascular canals through which it now flows; and consequently the mechanical resistance to its passage is increased in corresponding ratio. It is estimated, from data derived from microscopic inspection of the capillary circulation in transparent tissues, that the rate of movement of the blood in these vessels is about $\frac{1}{3}$ of an inch per second. It must be remembered, however, that while the capillary vessels are excessively numerous, and their united calibre therefore very large, their length, on the other hand, is very small. The effect of this anatomical arrangement accordingly is to disseminate a comparatively small quantity of blood, while it is contained in the capillary vessels, over a very large space; so that the physiological and chemical reactions taking place between the blood and the substance of the tissues are accomplished almost instantaneously. Furthermore, although the rate of movement of the blood in these vessels is very slow, yet as the distance to be passed over between the arteries and the veins is very small, the blood requires but a few seconds to traverse the capillary system, and to commence its returning passage by the veins.—*Movement of the blood in the veins.* In the veins the blood is gradually collected from the peripheral parts of the circulatory system and returned to the right side of the heart. Beginning by small rootlets directly connected with the capillaries, the veins constantly unite with each other into larger branches and trunks, converging in this way toward the centre of the circulation, until they terminate in the right auricle of the heart by two great canals, one coming from the upper and one from the lower parts of the body, and named accordingly the *vena cava superior* and the *vena cava inferior*. The walls of the veins are thinner than those of the arteries, and are less distensible and less

elastic; but they have great strength owing to the large proportion of white fibrous tissue in their structure, and are able to resist without laceration an equal or even greater pressure than the arteries of corresponding size. They are provided at various intervals with membranous semi-lunar valves, which open toward the heart and shut backward in the opposite direction. The main cause of the movement of the blood in the veins is the pressure from behind exerted by the blood as it is carried through the capillary circulation. It thus fills the rootlets and smaller branches of the veins with a constantly increasing supply, and urges the blood which they already contained onward to the heart. If this were the only force at work, the venous system would after a time become so filled with blood that its resistance would counterbalance the pressure of blood from the arteries, and the circulation would come to an end by simple engorgement of the veins. But in point of fact the right ventricle of the heart at each pulsation discharges into the pulmonary artery, and, as it were, lifts away from the venous system a portion of the blood which had accumulated in it. Thus the veins are protected from engorgement, and their backward resistance is kept always inferior to the pressure by which the blood enters them from the capillaries. The venous circulation is also much facilitated by the alternate contraction and relaxation of the voluntary muscles. When any one of these muscles contracts, it increases in thickness exactly in proportion as it diminishes in length. The effect of this lateral swelling of the muscles in activity is to compress the veins situated between them, and the blood is thus forced out of the compressed portion. The valves of the veins, already mentioned, prevent the blood from regurgitating toward the extremities, and it is consequently driven onward toward the heart, in which direction alone the passage for it is clear. When the muscles relax, the corresponding portion of the vein is again rapidly filled with blood coming from the extremities, and the circulation goes on with increased facility from the circumference toward the centre.—*Variations of the circulation in different parts.* We know that the capillary circulation in various parts of the body is subject to marked variations, dependent on external or internal causes. Thus a mustard poultice, or a sponge moistened with water of ammonia, applied to the skin, will cause a local and circumscribed redness, due to an increased capillary circulation in the part. The face will become flushed or pallid under the influence of mental emotion, and cold or hot applications will cause a similar change of color in those parts of the skin with which they are brought in contact. Even the internal organs exhibit fluctuations of the circulation of the same kind, to a marked degree. When a glandular organ is about to enter into active secretion, it is the seat of a kind of

physiological congestion. Its capillary blood vessels enlarge in diameter, and admit a greater quantity of blood than before. The rapidity of the capillary circulation is at the same time increased, so that a larger quantity of blood than usual passes in a given time through the vessels of the part. When the period of functional activity comes to an end, the capillary vessels return to their original diameter, admit a smaller quantity of blood, and the color of the organ resumes its ordinary pallid state. These variations in the capillary circulation are due to the action of the smaller arteries. The arteries generally, as we have already shown, are characterized mainly by their passive physical property of elasticity. But the medium-sized and especially the smaller arteries are provided also with minute muscular fibres, running round them in a circular or transverse direction, and forming part of their middle coats. By the greater or less degree of contraction of these muscular fibres, the calibre of the arterial twig is enlarged or diminished, and consequently the quantity of blood admitted by it to the capillary vessels varies in a corresponding degree. Thus, although the circulation everywhere is kept up by the central force of the heart's action, yet its influence on particular parts is modified in degree by the contracted or relaxed condition of the smaller arteries.—*General rapidity of the circulation.* The time required for the blood to traverse the entire round of the double circulation, that is, through the lungs and the general capillary system, returning again to the right side of the heart, has been found by experiment to be very much shorter than was formerly supposed. The observations of Hering, Poisseuille, Blake, and Matteucci on this subject were made, for the most part, by injecting into the jugular vein of one side upon the living animal some substance, like ferrocyanide of potassium, which could readily be recognized by its chemical reactions. Blood was at the same time drawn from the jugular vein of the opposite side; and the interval which elapsed before the appearance of the foreign salt in the blood drawn from this second opening indicated the time required for the blood to pass from the point of injection through the vena cava to the heart, from the right side of the heart through the lungs to the left cavities, from the left ventricle through the carotid arteries and the capillary vessels of the head, and thence downward to the jugular vein on the opposite side. The average results obtained from these experiments were as follows:

TIME REQUISITE FOR THE COMPLETE CIRCULATION OF THE BLOOD.

In the horse.....	28 seconds.
“ dog.....	15 “
“ goat.....	13 “
“ fox.....	12½ “
“ rabbit.....	7 “

In man the complete double circulation probably requires from 15 to 25 seconds.

CIRCUMCELLIONES, fanatics who, about the year 317, in the war of the Donatists in Africa, occasioned by the election of the Carthaginian bishop Cæcilianus, espoused the cause of the Numidians or Donatists, and went about as marauders to intimidate the Carthaginian party, and to commit excesses in which the Donatists rejoiced, but for which they were unwilling to be responsible. They had a strong desire for the honor of martyrdom, and sought it at the hands of the dominant party by violence upon the prevalent social institutions and the civil rights of the citizens. Thus they threw themselves between the debtor and creditor, and demanded the discharge of the claim by the creditor on pain of death. Whenever they met a master and a slave, they manumitted the slave, and compelled the master to take his place. Constantine treated these excesses with forbearance; but Constans, his successor, deprived the Donatists of their churches, and attempted to bring them to peace. This kindled the fanaticism of the Circumcelliones anew. Headed by Fasir and Axid, they committed new depredations, styling themselves Agonistici, and their leaders, “leaders of the sons of the Holy One.” Their frenzy increased so furiously that they committed suicide in great numbers, and the Donatist bishops were obliged to apply to the civil power to restrain them.

CIRCUMCISION (Lat. *circumcisio*, a cutting around), a practice of eastern nations, consisting in cutting off the prepuce or foreskin in males and the internal labia in females. Among the Jews it is a strictly religious rite, and is used only on males. In ancient times it was not only obligatory on all males born of Jewish parents, but also on all proselytes, and on all the slaves of Jewish masters. The rite originated, according to the book of Genesis, in the command of God to Abraham, and was nationalized by Moses. It was thenceforth practised by the Jews, except during the journey through the wilderness. Circumcision among the Jews is performed on the eighth day after birth. From the fact that this rite was required by religious ordinance, the term “uncircumcised” became a term of national reproach, and is analogous to the word “heathen” as used by Christian writers. The Egyptians, according to Herodotus, practised circumcision. It is certain that at a later period in Egyptian history, under Persian and Greek influence, circumcision was confined to the priests and sages, but Herodotus makes no limitation in his statement. On the other hand, he states that the tonsure was confined to the priests. He also says that the Colchians (an Egyptian colony, as he believed) practised circumcision. The same authority tells us that the Ethiopians practised it; and to this day the Coptic and Abyssinian Christian churches observe the custom. The Abyssinian church imposes the rite on both sexes. The Epistle of Barnabas testifies to the fact of Egyptian circumcision, and declares also that the cere-

mony was observed by the Arabians and Syrians. Jerome says that in his day the majority of Egyptians, Idumæans, Ammonites, Moabites, and Ishmaelites were circumcised. The Mohammedans also practise it; and although the Koran does not enjoin it, it has extended itself wherever the Mohammedan religion has been adopted. In Arabia the rite is performed on both sexes. The Arabians have a tradition that Mohammed said that circumcision was honorable in women. Pythagoras is said to have submitted to circumcision in order to obtain instruction from the Egyptian priests in their sacred doctrines. A portion of the Phœnician nations practised the rite, but the Philistines did not. The aboriginal Mexicans were found to observe this custom. The Friendly Islanders, the inhabitants of the Indian archipelago, those on the west coast of Africa, those of Madagascar and the Philippine islands, and even the Hottentots, have a custom regarded as a remnant of the same observance.

CIRCUMNAVIGATION. Any voyage around the world is properly so called; but as modern commerce encircles every sea, the term is confined to continuous voyages around the globe for some specific purpose, as for survey, discovery, or other scientific object. The following list comprises the principal circumnavigators, with the date of the commencement of each voyage: Magalhaens, 1519; Mendana, 1567; Drake, 1577; Cavendish, 1586 and 1591; Queiros, 1605; Le Maire, 1615; Tasman, 1642; Dampier, 1679; Roger and Cooke, 1708; Roggeween, 1721; Anson, 1740; Byron, 1764; Wallis and Carteret, 1766; Bougainville, 1766; James Cook, 1768, 1772, and 1776; Krusenstern, 1803; Kotzebue, 1823; King and Fitzroy, 1826; Belcher, 1836; Dumont d'Urville, 1837; Wilkes, 1838. Travellers and tourists at the present day very frequently make entire circumnavigations of the globe, starting from any point in Europe or America, and availing themselves of the various established lines of communication.

CIRCUS, in ancient Rome, a place reserved for public games, races, and shows of different kinds. The *circus maximus*, in the valley now called Via de' Cerchi, was founded by Tarquin the Elder. It gradually became one of the most magnificent structures of Rome. The original temporary platforms erected at private expense, by patricians and equites, who alone witnessed the shows, were replaced by three galleries or tiers of seats, running in an elliptical form around the arena. Iron railings 12 to 14 ft. high, and a ditch 10 ft. broad and 10 ft. deep, a work of Cæsar, separated the seats from and defended them against the furious beasts of the arena. Through its middle length ran a low wall called *spina*, at each end of which were erected three wooden (afterward gilt) cylinders of conical shape, forming the goals of races. The *spina* was adorned with gilt statues, images of deities, reliefs, altars, and chapels, and at its middle with an obelisk 132 ft. high,

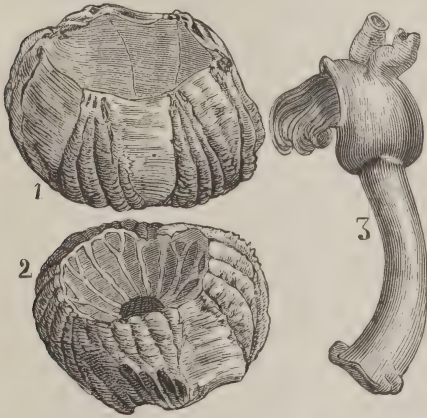
brought by Augustus from Egypt. There were also two platforms, on one of which reposed the images of seven dolphins, on the other the seven *ova*, imitations of eggs, which marked the numbers of the rounds done by the racers, one of the eggs being taken off after each. At one of the narrow sides of the circus the galleries were wanting, and replaced by the stores for chariots and horses. The length of the circus was in the time of Julius Cæsar more than 3 stadia, its breadth 400 ft., its circumference 8 stadia. Destroyed by fire under Nero, and rebuilt by Trajan, it was made by this emperor capable of containing 500,000 spectators, and completed under Constantine, who adorned it with another obelisk. The circus Flaminius or Apollinaris, erected probably by Caius Flaminius, in the Prata Flaminia, out of the city, and which in a show under Augustus was filled with water and became the scene where 36 crocodiles were killed; the circus of Sallust, near his gardens, destined for shows of sea fights; the Vaticanus, commenced by Caligula, completed by Nero; the Agonalis, erected by Alexander Severus; those of Flora and Hadrian; and the circus maximus, were all destroyed. A circus attributed by antiquaries to Caracalla, near the Appian way, about two miles from the city, is the only one that remains in good preservation at Rome. More or less remarkable ruins of similar structures, erected in the ancient provinces of the Roman empire, are still visible in Alexandria, Rhodes, Athens, Gaza, Jerusalem, Nîmes, Narbonne, &c.—In modern times the name is applied to a building or enclosure within which is contained a circular space designed for the exhibition of feats of horsemanship. The most celebrated amphitheatre in London used for this purpose is Astley's. The present edifice is the fourth which has been erected upon the same spot, the three previous ones having been destroyed by fire. In Paris and Madrid there are several circuses, the finest of which in the latter city, the Circo de Price, is one of the largest and handsomest amphitheatres in Europe. In the United States equestrian performances are exhibited by companies which travel through the country during the summer months. The exhibitions are given in large tents. The wagons used for the transportation of these tents and the performers, with the exhibition horses, form a large train, and enter the towns and villages on their route in grand procession. The capital invested in each enterprise of this kind is very great, and the number of companies engaged in the business is considerable.

CIRENCESTER (colloquially called *Ciceter*), a market town and parliamentary borough of Gloucestershire, England, on the river Churn, and on the Cheltenham branch of the Great Western railway, 15 m. E. S. E. of Gloucester, and 95 m. by rail N. W. of London; pop. in 1871, 7,681. It is one of the greatest marts in England for wool. It has a fine old church,

which has been restored at a cost of £12,000, and a free grammar school founded under Henry VII. Near the town is a noted agricultural college. It occupies the site of a Roman station called by Ptolemy Corinium, by Richard of Cirencester Corinum, and by Antoninus Durocornovium.

CIRILLO, Domenico, an Italian republican and naturalist, born in 1734, died on the scaffold at Naples in 1799. He officiated in early life as professor of botany, afterward accompanied Lady Walpole to France and England, became a fellow of the royal society of London, a friend of Buffon, D'Alembert, and Diderot, and on his return to Naples was appointed physician of the court. After the proclamation of the republic by the French, he was chosen representative of the Neapolitan people, and member of the legislative commission (1799); and on the reestablishment of royalty he suffered death on the scaffold, rather than take the oath of allegiance or ask a pardon from King Ferdinand. His chief writings are *Fundamenta Botanica* (2 vols. 8vo, 1787), and *Entomologia Neapolitana Specimen* (folio, 1787).

CIRRIPEDES, or **Cirrhopoda** (Lat. *cirrus*, curly, and *pes*, a foot), a group of articulated animals, long regarded as belonging to the *mollusca*, but



Specimens of the Group of Cirripedes. 1 and 2. *Coronula diadema* (sessile). 3. *Conchoderma aurita* (pedunculated).

really to the class of crustaceans, and to the order of entomostracans. The barnacles and acorn shells formerly described among the multivalves are included in this class. Their bodies are soft and protected by the shelly covering secreted from their surface. But the anatomical structure of the cirripedes (of the nervous system particularly) connects them with the articulata, and so also their development from the egg and subsequent transformation. (See BARNACLE.) A peculiar feature is the prolongation of the body and its division into several branches, each of which is furnished with a pair of curled arms filled with cilia or hair-like filaments resembling feathers, and which are constantly moving in the water

for the purpose of collecting food. The class is divided into two principal groups, the pedunculated and the sessile; the former, like *anatif*, having a long peduncle, or footstalk, by which the animal fastens itself to rocks or wood; and the latter, like the barnacle, being deficient in this, the shell consequently lying close to the substance to which the animal adheres. Several genera of each group are described, all marine.

CIRTA, the capital of the ancient Massylii, in Numidia, on the site of the modern city of Constantine, Algeria. It was built by architects from Carthage, and its name in Phœnician signified city. It had great natural strength, standing upon a steep rock, almost surrounded by a tributary of the Ampsaga (now the Rumei). The palace of the Massylian kings was one of its ornaments. In the second Punic war it was in league with Carthage during the reign of King Gala; but his son and successor Masinissa joined the Romans in 206 B. C., and contributed to their success, but was himself forced to fly before the Carthaginians and their ally Syphax, until toward the close of the war the Romans restored him. His successor Micipsa enlarged and beautified Cirta, settling Greek colonists in it, and in his time it maintained an army of 10,000 cavalry and 20,000 infantry. After his death, when the Romans divided the kingdom between Adherbal, the legitimate heir, and Jugurtha, the former held the capital. He was besieged there by Jugurtha, and forced to surrender. This act brought on the Jugurthine war, and after the defeat and death of Jugurtha Cirta passed with the rest of Numidia under the Romans, who established there a colony, called *Colonia Sittianorum*, from the chief Sittius to whom it was granted by Julius Cæsar. It retained this name until the time of Constantine, who restored it from the ruin into which it had fallen, and called it Constantina. It was the central point for all the Roman roads in Numidia. Its ruins are more extended than the modern city. Among them are the bridge across the Rumei, adorned with bass reliefs, and still in good repair, and four gates with Roman sculptures. A triumphal arch has been removed to Paris.

CISALPINE REPUBLIC, a commonwealth founded by Bonaparte in Italy in 1797, consisting of the Cispadane and Transpadane republics, which he had previously established. It embraced Austrian Lombardy, including Mantua, the Venetian districts of Bergamo, Brescia, and Cremona, Verona and Rovigo, the duchy of Modena, the principalities of Massa and Carrara, with the three legations of Bologna, Ferrara, and Ravenna, besides a part of the Grisons. It was divided into ten departments, with Milan as the capital. Austria acknowledged its existence by the treaty of Campo Formio. It followed the destinies of the French in Italy. On their defeat in 1798 the republic was abolished, and reestablished in 1800, after

the victory of Marengo. Austria was again forced to acknowledge this independent state on the conclusion of the peace of Lunéville (1801). Instead of Cisalpine, it was called (1802) the Italian republic, and under the empire it became the kingdom of Italy.

CISLEITHANIA, or *Cisleithan Austria*, a name which since 1867 is frequently (but not officially) applied to that part of the Austro-Hungarian monarchy which is represented in the Reichsrath of Vienna. It embraces the crownlands formerly belonging to the German confederation, Dalmatia, Galicia, and Bukowina. The name is derived from the little river Leitha, which separates Lower Austria from Hungary, and thus forms part of the frontier. It contains a little less than one half the area and about four sevenths of the population of the monarchy.

CISPADANE REPUBLIC, a republican state organized in Italy by Bonaparte after the battle of Lodi, in 1796. It consisted of Modena, Reggio, Ferrara, and Bologna, being separated from the Transpadane republic by the Po (Padus), from which it derived its name. In 1797 the Cispadane was merged in the Cisalpine republic.

CISSEY, Ernest Louis Octave Courtot de, a French soldier, born in Paris in 1812. He belongs to a noble family of Burgundy, and was educated at Saint Cyr and at the school for staff officers. In 1835 he became aide-de-camp of Gen. Trézel, and served with distinction in Algeria till 1852, and in 1854 in the Crimea, reaching the rank of brigadier general after the battle of Inkerman. He was commanding general of the 11th division at Rennes from 1863 till the outbreak of the Franco-German war in 1870, when he led the first division of the fourth corps under Ladmirault in a number of engagements near Metz. He disapproved (Oct. 22) of Bazaine's determination to capitulate, urging in vain a renewed attempt to break through the German lines. Bazaine sent him to the headquarters of the chief of staff of the German army, to arrange the terms of capitulation in such a manner as to include in them only the city and citadel of Metz, and not the French army; but he accomplished nothing, and became for a short time a prisoner of war in Germany. In February, 1871, he was elected to the national assembly for the department of Ille-et-Vilaine, and joining the army at Versailles in March, he operated at the head of the second corps against the commune, entered Paris May 22, and succeeded in gaining control of the entire left bank of the Seine. He was appointed minister of war June 5, and continued (1873) to hold that office.

CISTERCIANS, a widely extended branch of the Benedictine order, founded in the 11th century by St. Robert, a French nobleman by birth, and a Benedictine abbot, who, being very zealous for the strict observance of the Benedictine rule, and unsuccessful in his efforts to enforce it in his abbey, placed himself at the head of some hermits and settled with them at Mo-

lesme. Some difficulties arising in this new community, he left it in company with several others, and made a new settlement at Cîteaux (Lat. *Cistercium*), near Dijon, in the diocese of Châlons-sur-Marne (1098). After enduring great poverty and hardships for some time, the infant community was taken under the protection of Eudes, duke of Burgundy, and the bishop of Châlons; the latter of whom erected it into an abbey, and appointed St. Robert abbot. The latter was recalled after a time to Molesme, and left Cîteaux under the direction of St. Alberic, after whose death, in 1109, St. Stephen Harding, an Englishman, became abbot. The austerities practised in this community were so great that many of the members died, and no person dared to enter the order, which was threatened with extinction. The accession of St. Bernard, with 30 young men, mostly of noble



A Cistercian Monk.

birth, saved it from destruction, and infused into it new life. It soon began to flourish and extend itself, so that in 1151 the number of abbeys had increased to 500, and in 1251 to 1,800. The order became so powerful that several popes were indebted to its recognition and support during the confusion of the 12th century for the maintenance of their authority. Cardinals, archbishops, and bishops often assisted at the general chapter of abbots. Two popes (Eugenius III. and Benedict XII.), 40 cardinals, and a great number of bishops were elected from the order, and several kings and princes assumed its habit. St. Bernard implanted a taste for literature and science in the order in its infancy, and took measures to have every monastery furnished with an excellent library. The especial branch of the Cistercians was music. The golden age of the order continued until the relaxation of discipline, and

the foundation of the Dominicans and Franciscans, caused it to begin to decline. Extraordinary and oft-repeated efforts were made to bring it back to its pristine state, but they proved only partially successful. The spirit of reform produced several new congregations under the Cistercian rule, the principal of which are the Bernardines and Feuillants. The number of convents of the Cistercian order at present existing is small. There are some in Austria, Switzerland, Poland, and Belgium. There is also one in Leicestershire, England, called Mt. St. Bernard. In Italy they have been suppressed, with the exception of one house in Rome. An order of Cistercian nuns was founded in 1120 by Abbot Stephen of Cîteaux. They were at first subject to the authority of the abbot general, subsequently to that of the diocesan bishops. They increased so rapidly that at one time they had 6,000 convents. In Germany some of the abbesses had till 1803 the dignity of princesses of the empire. The most celebrated convent of the order was that of Port Royal in France. At present (1873) only a few convents are left in Switzerland, Germany, and France.

CÎTEAUX, a hamlet of France, in the department of Côte d'Or, on the Vouge, 14 m. N. E. of Beaune, once celebrated on account of its abbey, the chief house of the Cistercian order. The abbey buildings, a great part of which still exist, were magnificent. They have been converted into a reformatory, religious, and industrial penitentiary for juvenile offenders, which is under the care of priests, sisters of charity, and lay brothers. An agricultural college is connected with it, and the institution produces excellent butter and other articles of trade, and is nearly self-supporting. The surrounding country, mostly belonging to the convent, was greatly indebted to the management of the abbots for the superiority of its wines. The vineyard in which the celebrated Clos-Vougeot is raised was formerly part of the property belonging to the abbey.

CITHÆRON (now *Elatia*), a range of mountains in Greece, separating Bœotia from Megaris and Attica. It is said to have derived its name from an early king of Plataea, who was an adviser of Jupiter in one of his angry dissensions with Juno. Hence the summit was sacred to Jupiter, and the festival of the Dædala, in honor of his reconciliation with his spouse, was celebrated upon it. Cithæron was also sacred to Bacchus, and the scene of his mystic rites. It was here that Actæon was changed into a stag and chased by his own hounds, that Pentheus was torn to pieces by the Bacchantes upon whose orgies he was stealing a look, and that the infant Œdipus suffered his exposure. Cithæron was covered with a forest which abounded in game. The Cithæronian lion, slain by Alcathous, was famed in mythology.

CITIZEN (Fr. *citoyen*), a member of a free commonwealth. Aristotle defines a citizen to be one who participates in the legislative and

judicial authority of the state. But in every state there are two classes of citizens, those who are permitted to participate in the government, and those who are not. All persons born within the state, irrespective of age, sex, or condition, are presumptively citizens; others may be admitted to citizenship either by special legislative enactment, or by some form of naturalization under general laws. The children of citizens born while their parents are abroad temporarily or on the public service are also citizens. But those only exercise the right of suffrage who in addition to citizenship have such other qualifications as the law may have prescribed. In the United States, by the 14th amendment to the constitution, all persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the state wherein they reside. This amendment put at rest the disputed question whether the freedmen and other blacks were citizens; but it does not embrace Indians who still retain their tribal relations, and who are therefore only in a much qualified sense subject to the jurisdiction of the United States. Sec. 2, art. 4 of the constitution, construed in *Ward v. Maryland*, 12 Wallace, 418, provides that "the citizens of each state shall be entitled to all privileges and immunities of citizens in the several states;" and the 14th amendment prohibits the states from abridging the privileges and immunities of citizens of the United States. This amendment was construed in the New Orleans slaughter house case, decided by the supreme court of the United States in April, 1873, in which it was shown that the privileges and immunities which belong to one as a citizen of a state, and those which pertain to a citizen of the United States, are not the same, and that the latter only are protected by the 14th amendment.—See Story's "Commentary on the Constitution," 4th ed., chap. 47, and appendix to vol. ii.

CITRIC ACID, the acid which gives to the fruits of the citron family their peculiar sour taste. It may be extracted from many fruits and vegetables, as oranges, currants, gooseberries, strawberries, raspberries, whortleberries, tamarinds, onions, and potatoes. The red elder berry contains so much of it that it has been proposed to substitute it in part for limes and lemons, from which the acid is now wholly prepared. The manufacture of citric acid is conducted at but few large establishments; but on a small scale it may be prepared by the same process that is adopted in the large way. Lemon juice is imported in a concentrated state, produced by evaporation at a gentle heat. It consists of citric acid 6 to 7 per cent., alcohol 5 to 6, and the remainder water, inorganic salts, &c. By some it is allowed to partially ferment, for the purpose of evaporating the clear liquor from the mucilage; or it is clarified in the usual method by the use of albumen in the form of the white of egg. Carbonate of lime in fine powder is then gradually added, and stirred in

so long as the effervescence continues. Citrate of lime (an insoluble powder) forms, and after being separated by drawing off the watery liquor is well washed with warm water. This salt is then intimately mixed with strong sulphuric acid diluted with six parts of water. After some hours the citrate is decomposed, the sulphuric acid having taken up the lime and formed an insoluble sulphate, setting the citric acid free. This, separated by decanting and filtering, is evaporated in leaden pans till it attains the specific gravity 1.13. The evaporation is afterward continued by a water or steam bath till the liquor begins to be sirupy, or to be covered with a thin pellicle. It is then instantly removed from the fire, and put aside to crystallize, the mother liquor after a few days being evaporated as above, and again set to crystallize, and so on as long as clean crystals are obtained. To obtain pure citric acid, all the crystals should be redissolved and recrystallized, it may be several times, and the solution digested with bone black. A gallon of lemon juice should make about eight ounces of crystals; more than this is sometimes obtained. Attempts have been made to prepare the citrate of lime for exportation instead of the lemon juice, to reduce the cost of transportation; but its liability to ferment, which destroys the citric acid by converting it into acetic and butyric acids, prevents this method from being employed. Citric acid was first obtained by Scheele in 1784. The crystals are transparent, in the form of rhombic prisms, with summits of four trapezoidal faces. The salt is soluble in water, warm or cold, as also in alcohol, but not in ether. Its specific gravity is 1.6. Its taste is intensely acid, and almost caustic, but still agreeable. It is distinguished from other vegetable acids by its depositing an insoluble citrate when heated with lime water, by the form of its crystals, and also by forming a deliquescent salt with potassa. The crystals are combinations of 1 equivalent of citric acid with either 3, 4, or 5 of water, according to the method and temperature by which they have been obtained. The anhydrous acid, as it exists in the citrate of silver, is represented by the formula $C_6H_5O_7$; but it has never been isolated.—Citric acid is much used at sea as an antiscorbutic, but the raw lemon juice is thought to be more efficient. English vessels are all required by law to carry a certain quantity of the latter for each man employed. It goes to the manufacture of citric acid, as already stated, in a concentrated form; but that intended for the use of ships is protected from fermentation by the addition of some spirit. Citric acid is largely adulterated, sometimes to an almost incredible percentage, with tartaric acid. Acetate of potassa, added to its solution in cold water, will, if tartaric acid be present, throw down a white crystalline precipitate of bitartrate of potassa (cream of tartar). It sometimes also retains some sulphuric acid. Besides its use as an antiscorbutic, citric acid

is employed instead of lemon juice for the preparation of refreshing drinks, and in the arts it is of value to calico printers.

CITRON, the fruit of a low, evergreen tree (*Citrus medica*, Linn.), which belongs to the same genus as the lime, lemon, shaddock, and orange trees, attains in its wild state a height of about 8 ft., and is erect and prickly, with long reclining branches. Its leaves are alternate, oblong-acute, subserrate, and pale green; its petioles are naked, and its flowers 40-androus and externally purple; and its fruit is ovate, about 6 inches long, furrowed, with a protuberance at the tip, and with two rinds, the outer thin, greenish yellow, with numberless miliary glands, full of a most fragrant oil, and the inner thick, fungous, and white. The trees of this genus are among the most brilliant of fruit-bearing trees, are indigenous in the East, and are supposed to be alluded to in the golden apples which the Greeks attributed to the gar-



Citrus medica.

dens of the Hesperides. There is, however, no evidence that any of them were cultivated either by the Greeks or earlier Romans. The citron tree, the most beautiful of them, and the first introduced into Europe, was obtained from Media and perhaps Assyria, and was first cultivated in Italy by Palladius in the 2d century. In the East it is constantly in blossom, flowers and fruit always hanging upon the tree together; at Nice, Genoa, and Naples, and also in the West Indies, it endures the open air, but at Florence and Milan it requires protection in the winter, and in more northern climates it is cultivated in conservatories. In China there is a splendid variety, with large and solid fruit, divided at the end into five distinct lobes, whence it is called by the Chinese the fingered citron. It is kept for its agreeable fragrance on fine porcelain dishes in sitting rooms. The citron is a somewhat acid fruit, rarely eaten raw, and highly valued for its very fragrant rind, which by being preserved in sugar be-

comes a delicate sweetmeat. From the outside of the fruit and the leaves the oil of citron is prepared; the pulp furnishes citric acid; the seeds are very bitter and tonic; and the bark of the root is a febrifuge. There are 12 well known varieties of citron raised in Italy, and about 20 in French and 6 in English nurseries. There are 17 varieties described and figured, and the methods of their culture minutely given, in Risso's *Histoire naturelle des orangers* (Paris, 1818).

CITTÀ VECCHIA, or *Città Notabile*, a city of Malta, situated on high ground almost in the centre of the island, 6 m. W. of Valetta; pop. about 7,000. It contains a fine Roman Catholic cathedral and other churches, vast catacombs, several convents, an episcopal seminary, and an ancient palace of the grand masters of the order of St. John. Previous to the foundation of Valetta, in the latter part of the 16th century, it was the capital of Malta, under its old Arabic name of Medina (the city), and it continues to be the seat of a Roman Catholic bishop. It has lost all strategical importance, though it is walled. Some authorities regard it as identical with the town of Melita mentioned by ancient geographers. Others state that St. Paul, after having been shipwrecked on his journey to Rome, took refuge during three months in a grotto underneath the ancient church, on the site of the present cathedral.

CIUDAD REAL, Mexico. See SAN CRISTÓBAL.

CIUDAD REAL. I. A S. province of Spain, comprising the greater part of the old province of La Mancha, and a portion of New Castile proper; area, 7,837 sq. m.; pop. in 1867, 264,908. It consists mainly of barren plains skirted N. and S. by lofty sierras, some of which are clad with forests, and enclose many deep valleys. They give rise to several rivers, most of them affluents of the Guadiana, which impart fertility to the land in their immediate vicinity. The Guadiana itself, which rises near the border of the province, traverses it from E. to W. Wheat, rye, barley, maize, oats, beans, peas, hemp, flax, aniseed, and esparto are cultivated, and horned cattle, horses, mules, asses, sheep, goats, and pigs are reared. The mountains contain iron, silver, copper, lead, antimony, cinnabar, coal, marble, granite, quartzite, jasper, &c. In the S. W. corner of the province is the famous quicksilver mine of Almaden. Hot and cold mineral springs are abundant. The manufactures include woollens, linen, cotton, silk, hardware, earthenware, saltpetre, soap, wine, oil, and brandy, and the exports consist of these articles, with many of the natural products. The imports are lace, perfumery, sugar, coffee, and rice. Manzanares, Almodovar, Calatrava, and Valdepeñas are among the more important places. II. The capital of the province, situated in a low plain about 5 m. from the Guadiana and 100 m. S. S. W. of Madrid; pop. about 10,000. Built after the expulsion of the Moors from La Mancha to serve as a check upon the

remnant of that people who still maintained themselves in the Sierra Morena, it was originally a place of strength, and yet retains a portion of its ancient defences, which, with its solid-looking houses and rich surrounding vegetation, convey on a distant view a pleasing impression. A closer inspection shows the walls to be ruinous, the town dull and half deserted. The streets, however, are wide, level, and regular; most of the houses have iron railings and balconies, and those facing the principal public square are lined with arcades. The handsomest building is the church of Santa Maria, consisting only of a Gothic nave of magnificent proportions, with a high stone tower. There are several other churches, six monasteries, three nunneries, hospitals, a secondary college, a superior school, a house of refuge for juvenile vagrants, and fine barracks. It is the seat of a bishopric. The manufactures consist chiefly of coarse strong woollens, linens, table cloths, and watches. Trade is confined principally to grain, potatoes, wine, fruits, and mules. The railway from Madrid to Badajoz passes through it. Before the final conquest of Granada this was a frontier city and seat of the court of chancery for the south. It was the headquarters of the *Hermanidad*, or holy brotherhood, founded in 1249, for the suppression of highway robbery. A battle was fought in the vicinity, March 27, 1809, in which Gen. Sébastiani, with 12,000 men, gained an easy victory over 19,000 Spaniards commanded by Urbino, count of Cartoajal. The Spaniards lost 1,000 killed, 3,000 prisoners, and a quantity of arms and provisions.

CIUDAD RODRIGO, a town of Spain, in the province and 44 m. S. W. of Salamanca, situated on the right bank of the Agueda, 15 m. from the Portuguese boundary; pop. about 6,500. It occupies one of the most important positions on the frontiers of Spain, and is fortified by walls, a ditch, a castle, and other works, ranking as a fortress of the second class. It derives its name from its founder, Count Rodrigo Gonzales Giron, who lived about the middle of the 12th century. It is indifferently built, but has a few interesting structures, including the cathedral, a cruciform edifice which has suffered somewhat from sieges, the chapel of Cerralbo, still beautiful despite its dilapidation, an Augustinian convent and church; and a handsome bridge of seven arches across the Agueda, connecting the city with its suburbs. In the market place are three Roman columns with inscriptions, brought from ancient Malabriga, and borne by the city for its arms. It occupies a prominent place in the early annals of Spain, but its present historical importance depends mainly upon the events of the peninsular war. In 1810 it was invested by the French under Masséna, was gallantly defended by the Spanish garrison, and after a siege of about 40 days was forced to capitulate. On Jan. 8, 1812, Wellington suddenly crossed the Agueda, carried one of the advanced redoubts

by assault, established his batteries, and on the 14th commenced a furious bombardment. On the 19th two breaches were declared practicable, and on that night the town was stormed in the face of a murderous fire. By this exploit the British captured 150 guns and a vast amount of stores, but lost 1,300 men. The French lost 300 killed and 1,500 prisoners. Wellington was created duke of Ciudad Rodrigo by Spain, marquis of Torres Vedras by Portugal, and raised from viscount to earl by his own government.

CIVET (*viverra civetta*, Linn.), a digitigrade carnivorous mammal, belonging to the family *verridæ*, inhabiting northern Africa. The dentition is less carnivorous than that of the cats, there being three false molars above and



Civet (*Viverra civetta*).

four below, the anterior of which occasionally drops out; two tuberculous, tolerably large above, and one only below; the lower carnivorous tooth has even two projecting tubercles on the inner side in front, and the whole of it is more or less tuberculous. The tongue is rough, the claws are partly straightened in walking, and between the anus and the genital opening is a sac, divided into two parts, lined with glands which secrete an unctuous substance of a strong musk-like odor. The civet is about $2\frac{1}{2}$ ft. long from the nose to the end of the tail, the latter being more than a foot of this length; and the height is about 15 inches. The general color is an iron gray, with transverse black bands, narrow and parallel on the shoulders, wider on the body and thighs, and sometimes forming curved eye-like spots; the tail has four or five blackish rings, and the last six inches entirely black; the neck is whitish, with three black bands; the muzzle is black, except the upper lip, which is white, and there is no spot under the eye as in the zibeth; the limbs are black; along the back is a strong, stiff, erectile mane; the fore part of the ears is grayish white and the hind part black; the under parts are white, the hairs being dark at the base. These colors vary somewhat in different specimens. According to Cuvier, the cavities which contain the scent have their internal surface slightly covered with fine hair and pierced with many holes, the openings of superficial oval follicles, whose cavities receive

the odorous substance and discharge it into the main bag in a vermicelli-like form; the follicles as well as the bag may be compressed by muscular action at the will of the animal. Besides this, the civet secretes a dark-colored fetid liquid, which issues from an opening on each side of the anus. In Abyssinia and some parts of Asia the civet is kept in considerable numbers in a state of domestication for the sake of its musky secretion. In confinement it is a very sleepy animal, doing nothing but eat and sleep. When irritated, the musky odor becomes stronger. When the bag becomes filled with the hardened secretion, it falls out in pieces about the size of an almond. When first secreted it is semi-liquid and yellowish in color, becoming harder and brown on exposure to the air; the taste is bitter and the odor less agreeable than musk. It is insoluble in water, slightly soluble in ether and cold alcohol, and almost entirely so in hot alcohol. It contains a volatile oil and free ammonia. Formerly it was highly esteemed as a stimulant and antispasmodic medicine, but castor and musk, also animal secretions, have taken its place, and its use is now confined to the manufacture of perfumery. In its wild state the civet is a nocturnal animal, preying upon the smaller mammals, birds, and reptiles, and occasionally eating fruits; in confinement its food is more varied.—The zibeth and the rasse (*V. zibetta*, Linn., and *V. rasse*, Horsf.), the former inhabiting the Asiatic continent and the latter the islands of the Indian archipelago, especially Java, both secrete an odorous substance like civet, a favorite perfume in the East; it is now less esteemed in Europe than musk.—This family is represented in America by the civet cat, or *cacomixl* of the Mexicans (*bassariscus astuta*, Licht.), about as large as a cat, but more slender. It is brownish yellow above, mixed with



Civet Cat (*Bassariscus astuta*).

gray below, the tail white with six to eight black rings, rather full. It is an arboreal animal, and is easily tamed.

CIVIALE, Jean, a French surgeon, the originator of the modern operation of lithotomy, born near Thiézac, Auvergne, in 1792, died in Paris, June 13, 1867. At a very early age,

while a pupil of Dupuytren at the Hôtel Dieu hospital in Paris, his attention is said to have been attracted to the subject of his future discovery; and after many years of perseverance he succeeded, not without encountering opposition and even ridicule, in perfecting his ideas, and introducing to the profession his new operation of lithotripsy, *i. e.*, crushing stone in the bladder and removing it by the natural passages. Before that time the only means of extracting from the bladder a calculus of considerable size, was the serious and often dangerous operation of lithotomy. (See *STONE*.) He was the teacher of several generations of lithotritists, both of his own and other countries, and became a member of the medical academy, an associate member of the institute, and an officer of the legion of honor. His principal publications are: *De la lithotritie, ou broiement de la pierre* (Paris, 1827); *Lettres sur la lithotritie, &c.* (1827); *Traité pratique et historique de la lithotritie* (1847); *Résultats cliniques de la lithotritie pendant les années 1860-64* (1865). At the time of his death he had nearly finished *Guide pratique pour les opérations de la taille et de la lithotritie*, since published under the direction of M. Guardia, the deputy librarian of the academy of medicine, with a biographical sketch, and *L'Histoire de la lithotritie, d'après des documents inédits*.

CIVIL LAW, the positive municipal law of the Roman empire, as comprised in the collections made by order of the emperor Justinian (529-533) and published by his authority. These collections were the Institutes, the Digest (Pandects), the Code, and the Novellæ, which, comprised in one work, are called the *Corpus Juris Civilis*, by way of distinction from the canon law. The Roman law in general comprehends all the laws which prevailed among the ancient Romans, without regard to the time of their origin. The Roman jurists used the term civil law, *jus civile*, to designate the law applicable to Roman citizens only, in contradistinction to the law applicable to aliens, which was called *jus gentium*, the laws of other nations. With regard to its object, the Romans divided the law (*jus*) into public and private. The public law comprehended those rules of law which relate to the constitution and government of the state, and the relations of the people to the government. The private law comprehended those rules which pertained to the judicial relations of citizens among themselves. The private law was again divided into *jus naturale*, *jus gentium*, and *jus civile* (natural law, the laws of other nations, and civil law). *Jus naturale* was the name given to that law which is derived from the animal nature of man, and from those instincts which he has in common with the brute creation. *Jus gentium* denoted that law which is founded upon the rational nature of man, and which on this account was recognized by all the civilized nations of the time. By *jus civile* they under-

stood that part of the private law which was established by the state, and the enactments of which, according to Ulpian, neither totally deviate from the *jus naturale* and *jus gentium*, nor entirely follow them; but which sometimes add to and sometimes subtract from them. Hence, in the *jus naturale* man is regarded as an animal, in the *jus gentium* as a rational being, and in the *jus civile* as a member of an individual community or body politic. The civil law was subdivided into written and unwritten. By the term written law was understood that which was actually committed to writing, whether it had originated by enactment or by custom, in contradistinction to such parts of the law of custom as were not committed to writing. Hence among the Romans the praetorian edicts (*edicta praetorum*) and the legal opinions of jurists (*responsa prudentum*) belonged to the written law. The law introduced by the praetors and aediles, through their edicts, was denominated *jus honorarium* (honorary law), called so no doubt from the public offices with which the praetors and aediles were invested, and from which that law issued; and hence signifying law delivered by the magistrates, as contradistinguished from the strict civil law of the twelve tables and the law of custom. In order to obtain a full insight into the Roman law, and the civil law as preserved in the collections of Justinian, it is necessary to consider its origin, its history, and its gradual development.—The history of the Roman law may be divided into four periods, as first distinguished by Gibbon in his "History of the Decline and Fall of the Roman Empire." The first period extends from the foundation of Rome to the adoption of the twelve tables, A. U. C. 1 to about 300; the second thence to Cicero, about A. U. C. 650; the third, from Cicero to Alexander Severus, about A. U. C. 1000; the fourth, from Alexander Severus to Justinian, about A. U. C. 1300.—*First Period*, A. U. C. 1-300. During four fifths of this time the form of government was a monarchy. A king elected for life was the head of the state, and joined to him was a senate, consisting of patricians only. The legislative power remained with the people, and was exercised by them in their national assemblies (*comitia*). The king and senate were each entitled to propose laws, which were then discussed and voted upon in the meetings of the people, at first by *curiæ*, which were formed solely by the patricians; in later times by *centuriæ*, of which the plebeians also were members, whereby they first obtained some political importance and share in legislation. The laws proposed, if adopted in these meetings of the people, obtained legal force, and were known as *leges curiatae* or *centuriatae*. The ancient *leges curiatae* are said to have been collected in the time of Tarquin the Proud, the last of the kings, by a pontifex maximus named Sextus or Publius Papirius. The existing fragments

of this collection are few and of very doubtful character. After the kings were expelled, A. U. C. 244, Rome became a republic, and two consuls elected annually were substituted for the king. The adoption of laws and the election of magistrates now took place in the *comitia centuriata*, in which the patricians by their rank and wealth overbalanced the plebeians. Therefore the tribunes of the plebs (A. U. C. 260) were established, chosen from the plebeians to protect their rights. They had at first only the right to protest against the decrees of the consuls and the senate, and to render them ineffective by their veto; but they soon after acquired also the right, as chiefs of the plebeians, to propose laws to them in the *comitia tributa*, which were only subjected to the discussion and suffrage of the plebeians. These laws were called *plebiscita*. Besides the tribunes, two other magistrates of their own, called *ædiles*, were at the same time granted to the plebeians. Their duty was to take charge of the police, and attend to the public welfare in respect of certain edifices and archives. From all other higher offices the plebeians continued to be excluded, and it was not till the second period that the dignities of consul, *ædilis*, *curulis*, dictator, censor, prætor, and at last even that of pontifex, became accessible to them. About A. U. C. 300 the celebrated law of the twelve tables was enacted. This law bears the character not of a new civil code, but rather of a constitution, being, as it were, an act of capitulation of each class to the other. Its main purpose was to establish by law the equality of the patricians and plebeians; to define the limits of the judicial power, then in the hands of the consuls; and to regulate judicial proceedings. Moreover, a large part of the private law, as it had existed for a long time previous, was now committed to writing; and thus the twelve tables formed a compilation in writing of the customary law existing at that time. Generally speaking, details were omitted and principles only were embodied; but in some instances, as for example the rules for observance of funeral services, the laws and obligations between neighbors, and the conduct of the creditor toward his debtors, they descend into minute details. At the same time the old laws peculiar to the different tribes were merged in one national system. This law of the twelve tables, adopted in the *comitia centuriata*, acquired great authority, and constituted the foundation of all the public and private law of the Romans subsequently, until the time of Justinian. By way of distinction it is sometimes called *lex*, law, or *lex decemviris*, law of the ten commissioners. The twelve tables were originally engraved upon wood or ivory, and publicly exposed before the rostra that they might be read by every one. After the devastation of Rome by the Gauls (A. U. C. 364), they were engraved on brass, and were found thus exposed in the 3d century of the Christian era. But we have now only frag-

ments of them, collected from the commentaries of Gaius, contained in the Pandects, from Ulpian's fragments, and from Festus *De Verborum Significatione*. The Institutes of Gaius (discovered A. D. 1816) and the Vatican Fragments (1823) have also supplied some genuine passages previously unknown.—*Second Period*, A. U. C. 300–650. The sources from which the law of the twelve tables and the unwritten law were supplied and developed were principally two, the written law and the unwritten law, that is, the law established by custom. The improvement of the law was effected by the judges and lawyers. The written law comprised the law decreed by the people (*leges*), the *plebiscita*, and the decrees of the senate (*senatus consulta*). The decrees of the Roman people were laws proposed by a magistrate presiding in the senate, and adopted by the people in the *comitia centuriata*. These related principally to the public law. The *plebiscita* were laws proposed by one of the tribunes, and passed by the plebeians alone, in the *comitia tributa*, independently of the patricians. They were at first binding only on the plebeians, until in A. U. C. 305 a law was passed that they should be binding on the whole people. The *plebiscita* related more to private law. The decrees of the senate had generally reference to public laws. The tribunes had the right to protest against them. The law of custom related to private law. The kinds of this law were, the manners and customs of their ancestors, and transmitted to their descendants (*mores majorum*); the law which originated from the opinions and usages of the people (*consuetudo*); and the law formed by uniform judicial decisions in similar cases, and which the French call *la jurisprudence des arrêts*, and the Germans call *Praktik*, or judicial usage (*usus fori*), and which is in England and the United States the common law, as declared and established by the decisions of the highest tribunals. The greatest influence upon the development of the law was exercised by the prætors and other higher magistrates through their edicts, and by the lawyers through their commentaries on them, and their practical application of them to cases. The supreme judicial power was originally vested in the kings, and afterward in the consuls, who exercised it personally. After A. U. C. 387, a new magistrate for the administration of civil justice was established at Rome, under the title of city prætor (*prætor urbanus*). This word is derived from *præire*, to go before, and was in use in Latium to designate the chief magistrate of a city. His jurisdiction was at first restricted to cases in which both parties were Roman citizens; but the continual increase of strangers residing at Rome led to the appointment of another prætor about A. U. C. 508, to decide in cases of lawsuits of the non-Romans among themselves, or with Romans, and who was called *prætor peregrinus* (the prætor for strangers). The Roman law proper was applicable

to Roman citizens only. The system of general law principles acknowledged by the civilized nations of that time was called the *jus gentium* (law of other nations), and this law was applied to the non-Romans. It may be called a universal natural law, based on reason only. The use was soon extended to the Romans also, and the strict Roman civil law was modified by it. This change was effected chiefly by the edicts of the prætors. From the earliest periods the consuls, and later the prætors, the curule ædiles, the censors, and even the plebeian tribunes, had the right of publishing orders and notices connected with their respective functions; this right was styled the right to publish or declare (*edicere*). The use of this expression, however, more particularly belonged to those magistrates who had a certain jurisdiction; *e. g.*, the prætors and the two ædiles, and in the provinces the governor. Their jurisdiction consisted in the general capacity to declare the law. The prætors, when entering on their office, published an edict whereby they made known those legal principles on which they would administer law and justice, and the mode of proceeding which they would observe during the year of their office. By these edicts they seldom introduced new principles of law, but generally confirmed those which were established by usage and public opinion. Where they found deficiencies in the existing law, or deemed it no longer applicable to the times, they established the rules which they would follow in their decisions. They softened the rigor of the strict civil law, so that it might harmonize with equity. This edict which the prætor published on entering upon his office was called the perpetual edict, because it was not made for a particular case, but, although annual, was for the perpetual jurisdiction in all cases that might come before him during his year of office. Those decisions which had been established by custom, and transmitted from edict to edict, formed what was called the honorary law (*jus honorarium*). This is the origin of that prætorian law which advanced parallel with the Roman civil law; it was grounded on equity and natural justice. It was a work of science, of philosophy, and of progress, and supplanted the primitive Quiritarian law. The care of the police was intrusted to the magistrates called *ædiles*, as before stated. They, like the prætors, published their edict on entering upon their office. The law introduced by them, together with that of the prætors, belonged to the honorary law above alluded to. The lawyers assisted in developing the law by interpretation and legal opinions, called *responsa*. The law thus introduced by jurists was called *auctoritas prudentum* or *jus receptum*. There are few traces of legal works of a scientific character to be found in this period. At first only the patricians and pontifices had an intimate acquaintance with the existing law, and especially with the system of actions, the forms

of proceeding, and the times at which the courts were held (*dies fasti et nefasti*). Cn. Flavius, a clerk of the lawyer Appius Claudius (A. U. C. 450), published a book in which Claudius had composed and arranged the law actions; this book was called *Jus Flavianum*. The elder Cato wrote commentaries on the civil law and legal opinions. Among other distinguished lawyers were his son Cato Licinianus, Marcus Junius Brutus, and Manilius.—*Third Period*, A. U. C. 650–1000. After the battle of Actium (31 B. C.) Octavius Cæsar became, as *princeps reipublicæ*, under the surname of Augustus, the sovereign of the state, by uniting in his person the most important of the old republican offices. He still observed the old forms; but under his successors even these forms gradually disappeared; the power of the *principes* or emperors grew more and more absolute, and finally became despotism. The right of legislation was transferred by degrees from the people to the emperor, whose *constitutiones* soon began to supply the public as well as private law. The sources of law during this period were: 1, the decrees of the people; 2, those of the senate; 3, the constitutions of the emperors; 4, the prætorian edict; 5, the legal opinions of jurists; 6, the writings of the law commentators. 1. The decrees of the people, which still continued to be either *leges* or *plebiscita*, were never made in greater numbers than in the beginning, during the civil wars. Many among them were and continued to be important to the private law, *e. g.*, the *lex Julia et Papia Poppæa*, made under Augustus. But they became fewer as the supreme power of the emperors increased; and toward the end of this period they cease to be mentioned. 2. The decrees of the senate increased in number as those of the people decreased, and acquired a much greater importance than ever before. They now began to be named after either the consul who had proposed them, or the emperor himself, who made the motion in writing or orally, and sometimes after the person who had occasioned them; for instance, *senatus consultum Silanianum*, under Augustus; *senatus consultum Trebellianum*, under Nero. 3. When the Roman state had ceased to be a republic in fact, and several of the highest offices were united in the person of the emperor for his lifetime, he began, in imitation of the ancient republican magistrates, to issue ordinances and regulations by virtue of the power conferred on him. Such ordinances were called *placita* or constitutions of the emperor. When appeals from the ordinary courts came to be made to the emperors directly, they were soon induced to appoint a body composed of the higher state officers and jurists, to which they transferred the cases and questions presented to them for decision or opinion. This was called *auditorium principis*, and it soon became the supreme court for the whole empire. Its sentences and decisions, issued in the name of the emperor, were called *decreta*; and its legal

opinions, given either to private persons or officers, *rescripta*. There were four classes of constitutions: orations (addressed to the senate and requiring it to issue *senatus consulta*), edicts, mandates, rescripts, and decrees. The decrees and rescripts were generally made known through the *acta diurna* or daily papers, and may be compared to the *arrêts* of the kings of France. 4. The prætors and ædiles of Rome, as well as the proconsuls and prætors in the provinces, continued during this period to publish edicts on entering upon their offices. As many of them, however, probably took the liberty to deviate from them during their term of office, the tribune Cornelius (A. U. C. 687) procured the passage of a law prescribing that they should administer the law in accordance with their edicts. However, the importance of their edicts as a source of private law was much reduced. The prætorian edict formed for a long time a chief source of the private law, and became therefore a subject of literary disquisition and instruction. The want of uniformity in its plan, and the disregard of coherence shown in its gradual alteration and enlargement, rendered it necessary to reduce it to something like a system. The first who undertook this labor was Ofilius, a friend of Julius Cæsar; but this being the work of a private jurist, it was without legal authority. A revision of such a work was needed, but was not effected until the time of Hadrian (A. D. 117-138), when it was undertaken by Salvius Julianus, a distinguished jurist, who was also prætor, by order of that emperor. He was authorized to omit, to amend, and to add. The edict of the ædiles, which related chiefly to the police, was retained separately in an appendix. Hadrian caused this new revision to be confirmed by a special decree of the senate (131). From that time the edict remained substantially the same, and became a principal subject of legal instruction. Julian himself wrote commentaries upon it; and after him many others, among whom Ulpian deserves special mention. Only fragments of the edict are left. 5. From the earliest times it was a custom among the Romans, in doubtful cases, for private individuals as well as the magistrates themselves to apply to the jurists and request their legal opinions, called *responsa*. Before the time of Augustus, the responses thus given were merely lawyers' opinions, and had no legal authority. Augustus first allowed several distinguished jurists, by special grant, to respond in his name; and naturally the opinions given by them acquired a greater authority. Hadrian afterward ordered that the unanimous opinion of the jurists especially authorized to respond should have the force of law, and should be followed by the judges; but that in case their opinions disagreed, the judge should follow that opinion which he himself considered the most just. 6. In the scientific treatment and illustration of the law, this period surpassed all others both for the variety

and profoundness of its works. It is distinguished by the most eminent jurists that ever existed among the Romans, and they advanced the science of the law to a high degree of perfection, and are therefore usually called the classical jurists. Their writings contained excellent explanations and exhibitions of the law sources, and soon obtained a decisive authority in the courts, because the assistance of learned interpreters of the law was indispensable in applying the twelve tables and the edict to practice. The Pandects of Justinian were compiled from the writings of these jurists. The most distinguished jurists before Augustus were Q. Mucius Scævola, Aquilius Gallus, M. Tullius Cicero, Sextus Papirius, Ofilius, Trebatius Testa, and others. After the time of Augustus the Roman jurists specially authorized to respond on the law seem to have divided themselves into certain schools or legal sects. These schools, however, appear to have been only separate academies or offices (*stationes*) for giving legal opinions. The professors and chiefs of these differed in their elementary views, and were followed therein by their scholars for several generations. Many controversies arose therefrom, which were subsequently settled by imperial constitutions or by judicial decisions. The most eminent founders and adherents of these sects were Antistius Labeo, Proculus, Juventius Celsus, and Salvius Julianus. The most distinguished jurists after the time of Hadrian were Papirius Justus, Terentius Clemens, Ulpian Marcellus, and most particularly Gaius, Æmilius Papinianus, Domitius Ulpianus, Julius Paulus, and Modestinus. Jurists of less celebrity, although their writings have been compiled from, are Tertulianus, Licinius Rufinus, Rutilius Maximus, and others. The Institutes of Gaius are his most important work to us, because they formed the foundation of the Institutes of Justinian. They were discovered in 1816 by Niebuhr in a *codex rescriptus* at Verona. Most of the writings of Ulpian have been quoted in the Pandects; other parts are to be found in the *Fragmenta Vaticana*.—*Fourth Period*, A. U. C. 1000-1300. After the death of Alexander Severus (235) the Roman empire hastened rapidly to its complete fall. The confusion reached its greatest height when under Valerian (253-260) the Alemanni, the Franks, the Goths, and the Heruli invaded the Roman provinces. Constantine (306-337) founded on the shores of the Bosphorus a new seat of empire, where he then took up his abode. From this time the Christian religion became predominant, and the Latin language was gradually displaced by the Greek. Such important changes could not take place without great influence upon the Roman laws. The empire was divided anew under the sons of Constantine, and again (395) under the sons of Theodosius, of whom Arcadius obtained the East and Honorius the West. In the commencement of the 5th century Alaric, king of the Visigoths, made an attack upon Italy, and

plundered Rome; the Alans, Vandals, and Suevi advanced through Gaul to the Pyrenean peninsula, and thence to Africa; the Franks, Burgundians, and Ostrogoths took possession of Gaul, Helvetia, and the country bordering on the Rhine; while Britain became occupied by the Saxons, and Attila (about 450) invaded Gaul with his Huns, who everywhere carried destruction in their path. The Western empire was at last completely terminated by Odoacer (476). The power of the Romans was now limited to the empire of the East, which continued to the year 1453, when it was destroyed by the Turks. In this period the alterations of the law were almost exclusively effected by imperial ordinances and by customs. Most of them related to the administration of government, especially the finances, the war department, and the provinces; and the few relating to private law were usually only an application of the existing law to particular cases and persons. They were either general ordinances relating to the whole people, namely, edicts or personal constitutions, establishing provisions for single persons, as for instance privileges or mandates, imperial orders and directions for the officers of state, and decisions in judicial cases (*decreta*) which had been brought by way of appeal before the imperial council (*auditorium principis*), or answers and directions of the emperors (*rescripta*) upon applications or questions in doubtful cases, which were given, on the opinion of the imperial council, in conformity with the existing law. Before Constantine, most of the imperial ordinances were merely decrees and rescripts; but subsequently the edicts became very frequent, for the prevalence of Christianity had changed many of the former opinions of the nation, and the manners and language of the East, where the metropolis was placed, differed widely from those of the West. At the commencement of the 5th century the sources of law were at least theoretically as follows: 1, the ancient decrees of the people; 2, the decrees of the senate; 3, the edicts of the Roman magistrates; 4, the ordinances of the emperors; 5, the unwritten customs. The law of the twelve tables still formed the basis of the whole, and all the laws of later times had to them the relation of additions and modifications. But in practice only the writings of the classical jurists and the constitutions of the emperors were used as sources. Constantine determined by special ordinances what writings of the old jurists should have particular authority, and what should not be regarded. He prohibited reference to the notes of Ulpian and Paulus on Papinian. A century later (426) Theodosius II. issued a similar and yet more extensive ordinance, which was intended for the Eastern empire, but soon after obtained legal force also in the Western. This ordinance (which is often erroneously attributed to Valentinian III., and hence called Valentinian's law of quotation) provided that all the writ-

tings of Papinian, Paulus, Gaius, Ulpian, and Modestinus should have the force of legal authority. The same authority was extended to all those older jurists whose opinions and treatises were incorporated into and explained by the writings of the five above named, with the exception only of the notes of Ulpian and Paulus on Papinian. In case of the disagreement of those authorities, the majority were to decide; where the opinions were equally divided, that of Papinian was to have the preference; but where he was silent, the judge was to follow his own opinion.—The constitutions of the emperors were very numerous. Two jurists, Gregorius and Hermogenes, or according to others Gregorianus and Hermogenianus, in the early part of the 4th century, undertook two collections (*codices*) of imperial constitutions. Both collections, however, were almost exclusively composed of rescripts. The *Codex Gregorianus* contained the constitutions from Hadrian down to Constantine. The *Codex Hermogenianus* was only a supplement to the former, containing the constitutions of Diocletian and Maximinian. Only a few fragments are left of these collections. The *Codex Theodosianus* was of greater importance than either of the foregoing. By an ordinance of the emperor Theodosius the Younger, a committee of 16 jurists, of whom the ex-consul and ex-prefectus prætorio Antiochus was the chief, made a collection of the edicts of the emperors, including however many of the rescripts. This collection was published in 438, as a code for the Eastern empire. Theodosius sent this new code to his son-in-law Valentinian III., who confirmed it in the same year for the Western empire, and presented it to the senate at Rome, who received it with acclamation. It consisted of 16 books. The work has been recovered almost entire. After the completion of the *Codex Theodosianus*, the emperors Theodosius II., Valentinian III., and their successors, continued to issue new ordinances, which are termed *novellæ*, i. e., *novæ constitutiones* (new constitutions). These have been embodied in later times in the *Codex Theodosianus*, under the head of *Novellæ Constitutiones Imperatorum, Justiniano anteriorum, Theodosii, Valentiniani*, &c. From the time of Alexander Severus to Justinian there were hardly any writers on law of any importance. The literary productions were confined to collecting imperial constitutions, and compiling from the works of the old jurists.—After the fall of the Roman empire several new German states were formed in the West, in which the immigrated Germans and the conquered Romans lived together under the same government. The former had separate laws and customs of their own, which they preserved in their new settlements; while the subdued Romans, living among them, continued to use their own, and were judged according to them. The Germans committed to writing their primitive national laws, and the Romans did the same with their laws then in force. The most

important of those new Roman law collections among the German nations are: 1. The edict of Theodoric, king of the Ostrogoths, which he issued in Rome in 500, intended not only for the conquered Romans, but also for the Ostrogoths. This edict is derived entirely from the Roman law, and especially from the *Codex Theodosianus*, the later novels, and *Pauli Sententiæ receptæ*. But these sources were used so arbitrarily, that the character of the Roman law can scarcely be traced in them. 2. The *Breviarium Alaricianum* among the Visigoths. Alaric II., king of the Visigoths, published in 506 a code of laws affecting only the Romans living in his kingdom, which had been collected under his order by a committee of 16 Roman lawyers, from the *Codices Gregorianus*, *Hermogenianus*, and *Theodosianus*, as well as from some of the later novels, and from the writings of Gaius, Paulus, and Papinianus. Most of the passages are accompanied by a paraphrase (interpretation), in very bad Latin, but which was then intelligible. This Visigothic collection is now called *Breviarium Alaricianum* or *Breviarium Aniani*, from Anian, the private secretary of Alaric, who was ordered to authenticate by his signature the copies of the *Breviarium* sent to the magistrates of the counties. In the middle ages it is commonly referred to under the titles *Corpus Theodosianum*, *Lex Theodosiana*, *Liber Legum*, or *Lex Romana*. 3. Between the years 517 and 534 a *Lex Romana* was also published among the Burgundians, intended for the Roman subjects in the Burgundian empire, and which is known by the name of *Papiani Liber Responsorum*, or *Papiani Responsum*. The greater part of this collection is derived immediately from the pure sources of Roman law. After the time of Theodosius II. nothing was done in the East to facilitate the administration and study of the law until Justinian became emperor in 527. During the 38 years of his government (527–565) he made legislation and the promotion of the study of the law the principal objects of his attention; and fortunately he found jurists possessed of the knowledge and abilities requisite for his purpose. They made by his order those collections of law which continue in legal force in many countries to the present day. Justinian was the first after Theodosius who undertook a new collection of the imperial constitutions, which was intended to form a substitute for all previous collections. He appointed a committee of ten lawyers with very extensive powers. At their head was the ex-quæstor of the palace Johannes, and among them the well known lawyer Tribonian. His instructions were to select in the briefest manner all that was still of value in the existing collections, as well as in the later constitutions; to omit all obsolete matter; to introduce such alterations as were required by the times; and to divide the whole into appropriate titles. Within 14 months the committee had finished their labors. Justinian confirmed

this new code, which consisted of 12 books, by a special ordinance, and prohibited the use of the older collections of rescripts and edicts. This first code of Justinian, which is now called *Codex Vetus*, has been entirely lost.—*The Pandects*. After the above mentioned code was completed, Justinian ordered Tribonian (530), who was now quæstor, and 16 other jurists, to select all the most valuable passages from the writings of the old jurists which were considered as authoritative, and to arrange them according to their subjects under suitable heads. In regard to the writings from which they should extract, they were exempted from the Theodosian law of citation, and were not confined to the letter of the writings selected, but were allowed at their discretion to abbreviate, to add, and to make such alterations as they considered adapted to the times; and they were especially ordered to remove all contradictions of the old jurists, to avoid all repetitions, and to omit all that had become entirely obsolete. The consequence of this was, that the extracts did not everywhere truly represent the original, but were often interpolated and amended in conformity to the existing law. Alterations, modifications, and additions of this kind are now usually called *emblemata Triboniani*. This great work was completed by the commissioners in three years. They had extracted from the writings of no fewer than 39 jurists all that they considered valuable for the purpose of this compilation. Over every extract, which regularly consists of a *principium* and one or more paragraphs, a heading (*inscriptio*) was placed, containing the name of the work from which it was derived. The whole compilation, consisting of 50 books, was entitled “Digest or Pandects of the Eliminated Law, collected from all the ancient Law.” The word Pandects is derived from the Greek *πᾶν*, all, and *δέχομαι*, to receive, because all that was valuable was to be comprised in them. This work was intended for practical use. The arrangement of the titles follows as closely as possible the order of the edict. Justinian divided the whole work into seven parts. The editors of the Pandects divided into three classes all the books from which extracts were to be made, and formed themselves into three sections. The first section read and extracted from the books on the civil law, to which belonged the books on Sabinus; the second section extracted from the books on the prætorian edict, especially from Ulpian on edicts; and the third section, from practical and casuistical writings, especially from *Papiniani Responsa* and Paulus’s legal questions. Three branches of extracts were thus formed, the Sabinus branch, the edict branch, and the Papinian branch. From these three branches the single titles of the Pandects were composed. The foundation of each title was generally formed by that branch which furnished the most numerous and important fragments. The Pan-

deets were published by Justinian Dec. 16, 533; but they were not to have legal authority till Dec. 30. At the same time Justinian prohibited all further reference to the older jurists, forbade the writing of any commentaries upon the new compilation, and only permitted the making of literal translations into Greek, and the publication of parallel passages, with a summary table of their contents. In preparing the Pandects the compilers met very frequently with controversies in the writings of the jurists. Where they themselves did not venture to determine the questions in controversy, they presented them to Justinian for his special decision. Such questions, to the number of 34, had been already determined by Justinian before the commencement of the collection of the Pandects; and before its completion the decisions of this kind were increased to 50. These were embodied in the code. For the purpose of providing a more compendious book for beginners in the study of the law, Justinian ordered Tribonian, with the assistance of Theophilus and Dorotheus, to prepare a brief system of law, under the title of Institutes, which should contain the elements of legal science. They were charged to make the law then applicable their principal object; but they were also to pay some attention to the older laws. This work was founded on the Institutes of Gaius, from which all that was entirely obsolete was omitted, and the new constitutions of Justinian, as far as they had been issued at the time, were referred to. Justinian published the Institutes Nov. 21, 533, and they obtained legal force at the same time with the Pandects, Dec. 30, 533. After the publication of the Pandects and the Institutes, Justinian undertook a revision of the code which had been published in 529, because he had issued since that time a great number of new constitutions, and especially the 50 decisions, which were not comprised in the old code, and by which the law contained in the Pandects had been augmented, altered, or defined. He therefore in 534 ordered Tribonian, with the assistance of Dorotheus, Menna, Constantinus, and Johannes, to revise the old code, and to add the new constitutions. This revision was completed in the same year, and the new edition of the code (*Codex repetitæ Prælectionis*) was confirmed Nov. 16, 534, and the old code abolished. This new code contains only imperial constitutions, which from the time of Hadrian up to Constantine consist almost exclusively of rescripts, but from Constantine to Justinian are chiefly edicts or general laws. The code consists of 12 books, which are subdivided into titles, and in these the single constitutions relating to the same subject are arranged in chronological order.—*Manner of citing the Pandects.* There still continue to be different ways of citing the Pandects. Formerly it was usual to cite, for instance: *D. de jure dotium, L. profectionis, § Si Pater*; or, vice versa, *L. profectionis, § Si Pater, D. de jure*

dotium. From this afterward originated the following: *L. profectionis* 5, § *Si Pater* 6, *D. de jure dotium*; and lastly, *L. 5, § 6, D. de jure dotium.* This last form is most commonly used at present, but many, more accurately, prefer *Fr. (fragmentum)*, instead of *L.*; and most jurists add at the end, in a parenthesis, the number of the book and title; thus, *Fr. § 6, D. de jure dotium* (23, 3). In referring to the *principium* of a fragment, *pr.* is put in the place of the mark and number of the section; for example: *Fr. 5, pr. D. de jure dotium* (23, 3). Many, however cite only by numbers: *Fr. 5, § 6, D. 23, 5.* To indicate the Pandects the sign *ff.* is used, which is supposed to be derived from the Greek *II*, or from the symbol of the copyists representing *D.* The Institutes consist of four books, each of which contains several titles; each title commences with a *principium*, after which the single paragraphs follow. Formerly the Institutes were cited by the heading of the title and the initial words of the paragraphs; thus: § *Fratris vero, J. de nuptiis.* At present it is usual to give the heading of the title and the number of the paragraph: *F. § 3, J. de nuptiis*; or by numbers only: § 3, *J. 1, 10*; or, § 3, *J. de nuptiis* (1, 10). In referring to the *principia* of a title the abbreviation *pr.* is used: *pr. J. de nuptiis* (1, 10). The manner of citing the code is like that of the Pandects: *L. 22, C. mandati vel contra.* It is more correct to use *Const. (constitutio)* instead of *L.*, and to cite simply: *Const. 22, C. 4, 35*; or, *Const. 22, C. mandati vel contra* (4, 35). The novels are cited simply according to their number: *Nov. 113, cap. 1.*—During the long continuance of Justinian's government after the publication of the *Codex repetitæ Prælectionis* (535–565), he issued at different times a great number of new constitutions, by which the law on many subjects was entirely changed. The greatest part of these new constitutions were written in Greek, in obscure and pompous language, and published under the name of *Novellæ Constitutiones.* Soon after his death a collection of 168 novels was made, 154 of which had been issued by Justinian and the others by his successors. Afterward the glossators brought the novels into a collection of nine parts; in which, however, they embodied only 97 novels, because the others were considered no longer applicable. Soon after Justinian's death Julian composed a copious Latin extract from 125 novels, which is known under the name of *Epitome Novellarum* or *Liber Novellarum.* About the same time a Latin translation of the novels was made by an anonymous author, which contains only 134 novels. This translation, now termed *Versio vulgata*, was called by the glossators the *Corpus authenticum*, in order to distinguish it from the *Epitome Juliani.*—As the Latin language was not generally used among the Byzantines, Justinian's law collections were translated into Greek. Numerous constitutions were issued by his successors; and although he had ex-

pressly forbidden comments on his collections, the later jurists disregarded this prohibition, and a great number of Greek commentaries on Justinian's law collections were published, which had special reference to the alterations made in the East after his time. Hence the science of law became again so diffuse, that three centuries later (887) a new collection of the laws then applicable was made to supply this deficiency. In 876 the emperor Basil I. ordered an abridgment of the Roman and Greek law to be prepared for use as a text book. He afterward appointed a committee of jurists to make a compilation of the practical law in the Greek language, and for this purpose to reduce Justinian's law collections, and the constitutions issued by him and his successors, to a system embracing the whole. His son, Leo the Philosopher, completed and published it. This Romano-Greek code is called the *Basilica*. About 945 the emperor Constantine Porphyrogenitus undertook a new edition of the *Basilics*, which has been preserved to us.—During the anarchy of the middle ages arts and sciences declined, and so did the scientific study of the law. In the 12th century the study of the Roman law revived, especially at the law school of Bologna. Irnerius delivered lectures there, and founded the reputation of this school. He illustrated the text of Justinian's collections by brief annotations on their subjects and language, which were called glosses, and were placed in the margin at the side and partly under the text. Irnerius was followed in this manner of illustration by his pupils and successors; thence they are called glossators. The glossators also tried to facilitate the study of the law by inserting extracts from the novels of Justinian into those constitutions which were altered or modified by them. These quotations of the novels were afterward called *authenticae*. Soon after the revival of the study of the Roman law in Italy by the glossators, an equal zeal for it arose in the law schools and courts of France, and since the 16th century in Spain and the Netherlands, and in Germany since the 14th century. With most of the European nations, and in the new states in Spanish America, and in Louisiana, the Roman law constitutes the principal basis of their own law. In England the Roman law has never been adopted as a general subsidiary law. In Scotland the civil law has at all times been cultivated and taught. In Germany universities were established after the 14th century on the model of those in Italy, and professors of the Roman law were appointed. The authority of the Roman law in Germany is not based on a formal reception by the legislative power, but on its gradual introduction as a law of custom since the commencement of the 13th century. In 1495, in establishing the court of the imperial chamber, its members were ordered to administer justice in accordance with the imperial and common laws; by the latter the Roman and canon laws were understood.

The Roman law forms in Germany, in some branches, the principal law, in so far as the German law does not add to or modify it. In other branches it is only supplementary, that is, it only supplies the deficiencies of the German law. Only those parts and passages of Justinian's law collections are of force which are glossed, and only those of the glossed passages are binding which contain the latest legal rule. Those precepts of the Roman law which relate to Roman manners and institutions unknown in Germany are inapplicable there, though glossed; and the Roman law does not admit of application to such objects and transactions as were unknown to the Romans, and are purely of German origin. With the restrictions above enumerated, the Roman law has been adopted as common law in a body, and not by single principles. Therefore, he who can refer to a precept of the Roman law in support of his case has, as the practitioners call it, a *fundata intentio*; that is, the presumption is in favor of the validity and applicability of the precept referred to, until his adversary proves that it is included in one of the above mentioned exceptions, or that it can no longer be applied, or that it had been abolished by later law. However, the special civil codes in several German states, as in Prussia, Austria, Baden, and Saxony, and in France the civil code of Napoleon, have in a great measure supplanted the Roman law; but these codes, again, have in a great degree been based on the principles of the Roman law.—The principal editions of the *Corpus Juris* are: I. Glossed: that published at Lyons by the brothers Senneton (5 vols. fol., 1549-'50); that of Ant. Cortius (5 vols. 4to, Paris, 1576); the *Corpus Juris Civilis Glossatum, ex recensione Dionysii Gothofredi* (6 vols. fol., Lyons, 1589, without the title, *Corpus Juris*, &c.; with the title, 1604; enlarged and improved, 1612). II. The non-glossed editions are subdivided into those which contain explanatory notes of later jurists, and those which contain only the text, with or without the various readings. The best editions with notes are: that of L. Ruscus, *Jus Civile* (2 vols. fol., Lyons, 1560-'61; Antwerp, 1566-'67, and in 7 vols. 8vo., 1569-'70); that of Dionysius Gothofredus (4to, Lyons, 1583; Frankfurt, 1587; 2d ed., improved, 2 vols. fol., 1590; 3d ed., 4 vols. fol., Geneva, 1602; 4th ed., Lyons, 2 vols. fol., 1607; 4to, Geneva, 1614, and fol., 1615); the fifth and most complete edition was edited by his son, Jacob Gothofredus (fol., Geneva, 1624); this has been frequently published since; the edition of Antonius (4to, Lyons, 1652 and 1662) deserves particular mention. One of the best and most elegant editions with notes is that of Simon van Leeuwen from the last edition of Gothofredus, containing, besides Gothofredus's notes, the annotations of many others (fol., Frankfurt, 1663; 2 vols. 4to, Leipsic, 1705, 1720, and 1740). Without explanatory notes are: the Amsterdam edition,

printed by Elzevir (8vo, 1664, 1681, 1687, and 1700); editions by G. C. Gebauer and G. A. Spangenberg (Göttingen, 1776 and 1797), containing various readings and explanatory notes; Pothier, *Pandectæ Justinianæ in novum Ordinem digestæ*, &c. (3 vols. fol., Paris, 1748-'52, and 1818-'21); Schröder (Berlin, 1832). Several editions of the text and most important readings, without notes, have been published at Leipsic; among them that of Beck (2 vols., 1829-'37), and another of Kriegel brothers (1828-'37); Krüger's *Justiniani Institutiones* (1867); and Mommsen's *Digesta Justiniani* (1868). Valuable works on the history of the civil law, and on the different branches of the law, are: Hugo, *Lehrbuch der Geschichte des Römischen Rechts*, of which there is a French translation; Savigny, *Geschichte des Römischen Rechts im Mittelalter*, which has been translated into French and English; Guizot, *Histoire de la civilisation en France*; Puchta, *Institutionen* (Berlin, 1832), and his *Pandekten* (1852); Pardessus, *Mémoire sur l'origine du droit coutumier en France et sur son état jusqu'au treizième siècle* (1834); A. F. Justus Thibaut, *System des Pandektenrechts* (8th ed., 1837); Savigny, *Das heutige Römische Recht* (8 vols. and 2 vols.); *Obligationenrecht* (1840-'53); Laferrière, *Histoire du droit français* (6 vols., 1846); Giraud, *Essai sur l'histoire du droit français au moyen âge* (1846); Laferrière, *Essai sur l'histoire du droit français depuis les temps anciens jusqu'à nos jours* (2 vols., 1859); Seuffert, *Das praktische Pandektenrecht* (3 vols., 7th ed., 1860-'64), and *Das praktische gemeine Civilrecht* (3 vols., 3d ed., 1868); Vangerow, *Lehrbuch der Pandekten* (2 vols., 7th ed., 1863-'9); Keller, *Pandekten* (2d ed., by Lewis, 1866); Puchta, *Pandekten* (10th ed., by Rudorff, 1866); Arndts, *Lehrbuch der Pandekten* (6th ed., 1868); Mackeldey, *Handbuch des neuen Civilrechts*; "Gaius's Commentaries on the Roman Law, with an English translation and annotations," by Tomkins and Seniors (London, 1869); Tomkins and Jencken, "A Compendium of the Modern Roman Law, founded upon the treatises of Puchta, Von Vangerow, Arndts, F. Möhler, and the *Corpus Juris Civilis*" (London, 1870); Ortolan, *Histoire de la législation romaine et généralisation du droit* (Paris, 1870); translated into English by Prichard and Nasmith, London, 1871).

CIVILIS, **Claudius**, also called **JULIUS**, leader of the revolt of the Germanic nation of the Batavi (settled around the

mouths of the Rhine and Maas) against the Romans, A. D. 69-70, as chronicled by Tacitus. Although in the imperial service as prefect of a cohort, he was of the Batavian royal race, and had no reason to love the Romans, who had wrongfully put his brother to death and sought his own life. When the contest for the purple was going on between Vitellius and Vespasian, the partisans of the latter urged Civilis to a feigned revolt, so as to prevent the legions in Germany favorable to Vitellius from marching on Rome. Civilis determined to make the revolt a real one. Under pretext of a festival he assembled the chiefs of his nation in a sacred grove and induced them to rise against the Roman yoke. Having placed a young man named Brinno at their head as nominal leader, the Batavi and two neighboring tribes, their allies, gained some skirmishes; whereon, it being no longer possible to conceal that Civilis was the prime mover, he put himself at the head of the insurgents. Still keeping up the fiction that he was fighting for Vespasian, he attacked and destroyed all the Roman camps on the Rhine, excepting Cologne and Mentz, which he retained. As the Batavi continued in arms after Vespasian had gained the empire, Cerealis was sent against them with a powerful force. Civilis offered to make Cerealis emperor of the Gauls if he would come over to their side, but the offer was declined. A campaign followed with varying success, till finally fortune turned against the insurgents, and they were driven into the island of Batavia. Cerealis offered his adversary terms. An interview between the generals took place on a bridge, where Tacitus leaves them conversing. The subsequent history of Civilis is unknown.

CIVITÀ CASTELLANA, a fortified town of Italy, in the province and 25 m. N. of Rome, upon an elevated plateau, nearly surrounded by ravines; pop. about 3,500. The Maggiore and the Treja unite just below the town, and fall into the



Cività Castellana.

Tiber 5 m. below. The cathedral is inscribed with the date 1210. The citadel is built upon the isthmus which connects the town with the higher ground. The position is one of great military strength. It was the site of the ancient Falerii or Falerium, the walls of which are still in a state of excellent preservation, and are the best specimen of Roman fortification extant. (See *FALERII*.) The French under Macdonald here achieved a victory over the Neapolitans under Mack, Dec. 4, 1798.

CIVITÀ DI PENNE (anc. *Pinna Vestina*), a town of Italy, in the province of Teramo, situated at the foot of the Apennines, 14 m. W. of Pescara; pop. about 5,000. It was the chief city of the Vestini, and distinguished for the constancy with which it remained faithful to Rome, and resisted the overtures of the Italian allies in the social war.

CIVITÀ VECCHIA, a seaport town of Italy, on the Mediterranean, in the province and 37 m. N. W. of Rome, with which it is connected by railway; pop. about 10,000. The harbor consists of two marble piers fronted by a break-

water. The water is from 14 to 18 ft. in depth. Upon the breakwater are a lighthouse, a quarantine, docks, and a prison capable of containing 1,200 persons. The town is well built, and contains several fine churches, some monuments, and a small gallery of Etruscan antiquities. It is supplied with water by a remarkable aqueduct, constructed upon the foundations of one built by Trajan. It is the best port of central Italy on the Mediterranean, and is a stopping place for lines of steamers between Marseilles, Naples, Malta, and the Levant. Travellers going to Rome generally land here. It was founded by Trajan, who constructed its port, which was called *Portus Trajani*, and was one of his most remarkable works. It was destroyed by the Saracens early in the 9th century, but was rebuilt by Pope Leo IV. The fortress was commenced under Julius II., after designs by Michel Angelo, and completed under Paul III. The moles, quays, and fortifications were built upon the ancient foundations. Clement XII. made it a free port. Its privileges were taken away in 1850, but restored in 1855.



Civita Vecchia.

CLACKMANNANSHIRE, an E. and the smallest county of Scotland, bounded S. and S. W. by the river Forth; area, 46 sq. m.; pop. in 1871, 23,742. Its N. part is occupied by the Ochil hills, between which and the rich alluvial valley of the Forth the surface is somewhat diversified, though its general aspect is level. The Devon and the Black Devon, also called the North and South Devon, are the only considerable streams. Agriculture is in a very flourishing state. Coal is largely produced, and there are many other minerals. The chief manufactures are of woollen shawls, plaids, and blankets. There are several large breweries and distilleries, glass works, brick works, potteries, and a number of iron works. Alloa and Clackmannan, the county seat, are the principal towns. Communication is afforded by the Scottish Central, the Edinburgh and Glasgow, and the Stirling and Dunfermline railways.

CLAIBORNE. I. A S. W. county of Mississippi; area, 740 sq. m.; pop. in 1870, 13,886, of whom 9,996 were colored. The Mississippi river on the west separates it from Louisiana, and the Big Black river touches its N. W. bor-

der. The surface is uneven, but the soil is generally fertile. The chief productions in 1870 were 179,187 bushels of Indian corn, 10,206 of Irish and 18,330 of sweet potatoes, 193 tons of hay, and 14,776 bales of cotton. There were 2,006 horses, 2,048 mules and asses, 3,450 milch cows, 7,205 other cattle, 2,261 sheep, and 8,884 swine. Capital, Port Gibson. II. A N. W. parish of Louisiana, bordering on Arkansas, drained by the branches of Bayou d'Arbonne; area, about 1,200 sq. m.; pop. in 1870, 20,240, of whom 10,608 were colored. The surface is undulating, and partly covered with pine and other timber. The soil is good, though not of remarkable fertility. The chief productions in 1870 were 5,961 bushels of wheat, 475,374 of Indian corn, 95,914 of sweet potatoes, 15,889 lbs. of wool, and 14,900 bales of cotton. There were 1,863 horses, 2,226 mules and asses, 4,144 milch cows, 8,012 other cattle, 8,195 sheep, and 26,952 swine. There were 4 grist mills, 6 saw mills, one cotton and one woollen factory. Capital, Homer. III. A N. E. county of Tennessee, intersected by Powell's river, and bordering on Kentucky, touching Virginia on the N. E. corner, and

bounded S. by Clinch river; area, about 350 sq. m.; pop. in 1870, 9,321, of whom 758 were colored. The surface is hilly, and in some places mountainous. It possesses a fertile soil, and has mines of lead, zinc, and iron, the last of which are very extensive and profitably worked. The chief productions in 1870 were 33,901 bushels of wheat, 204,840 of Indian corn, 59,039 of oats, and 11,301 of potatoes. There were 1,752 horses, 2,112 milch cows, 3,613 other cattle, 9,730 sheep, and 11,942 swine. Capital, Tazewell.

CLAIRAUT, Alexis Claude, a French mathematician, born in Paris, May 7, 1713, died there, May 17, 1765. At the age of 13 he read before the French academy a memoir upon four curves of his own discovery; at 16 he had written a treatise upon curves of double curvature; and at 18 he was admitted into the academy of sciences. His maturer powers were employed in researches upon the figure of the earth, in which he demonstrated the theorem that the variation of gravity on the surface of the earth, considered as an elliptic spheroid, is altogether independent of the law of density, and may be deduced from a knowledge of the form of the exterior surface; on the theory of the moon; and on the orbit of Halley's comet. In each of these subjects he showed wonderful powers, and gained the most distinguished honor. He published numerous scientific works.

CLAIRFAIT. See CLERFAYT.

CLAIRON, Claire Joséphe Hippolyte Leyris de Latude, a French actress, born in Flanders in 1723, died in Paris, Jan. 18, 1803. She was not 13 years old when she appeared with great success at a Parisian theatre. She afterward became an opera singer, and finally was admitted in 1743 to the Théâtre Français, where she first played the part of Phédre. She greatly contributed to the success of several of Voltaire's tragedies; she paid a visit to the old poet at Ferney, and performed in his private theatre. Having declined to play in the *Siège de Calais* with a comedian guilty of an act of dishonesty, she was thrown into prison; and sufficient amends for such treatment having been denied her, she refused to reappear on the stage. She was then but 42 years of age, and her talent had reached its zenith. Her coquetry gave occasion for the publication of a scandalous pamphlet called *Histoire de Frétilon*. When 50 years old she became the favorite of the margrave of Anspach, at whose court she resided for nearly 18 years. In 1791, on being supplanted by Lady Craven, she returned to Paris, and published there in 1799 her *Mémoires*, which derive interest from their remarks on dramatic art. She died poor.

CLAIRVAUX, a village of France, in the department of Aube, on the left bank of the river Aube, 30 m. S. E. of Troyes; pop. about 2,000. It was the seat of a celebrated monastery dependent on the abbey of Cîteaux, founded in 1114, in a wild glen, by Hugues,

count of Champagne, and having St. Bernard as its first abbot. The foundation was increased by Thibaut, count of Champagne, and rich gifts were added by many kings of France, counts of Flanders, and other noble benefactors. The monks followed a rule of life which still further swelled their revenues. Timber was felled, saw mills were erected, the lands were drained and irrigated, farms were carefully tilled, tan yards, forges, oil mills, grain mills, fulling mills, and various hydraulic works were put in operation, cloth was woven, wool was spun, and the products not required for the use of the abbey were sold at Châtillon-sur-Seine, Bar-sur-Aube, &c. At the same time Clairvaux was a seat of learning, and was the abode at different periods of Pope Eugenius III., 15 cardinals, and many other dignitaries. In 1153 there were 700 monks within the abbey walls, and 76 other monasteries were affiliated to this. In the 17th century it possessed nearly 50 villages, a vast number of farms, large vineyards, 60,000 acres of forest, 1,500 acres of fallow land, 4 metal forges and founderies, and an income of \$120,000 a year; the number of its affiliated houses was 537, while the circuit of its walls exceeded that of the neighboring town of Chaumont. Its vast buildings have been converted into a prison (*maison centrale de détention*), where the convicts are employed in several trades, the proceeds of which defray the expenses of the establishment. It is one of the best regulated prisons in France. The abbey church, which contained the tombs of St. Bernard and of several kings and princes, was torn down to make room for the prison yard.

CLAJUS. I. Johann, a German clergyman and author, whose real name was CLAI, born at Herzberg, electoral Saxony, about 1533, died at Bendeleben, Thuringia, April 11, 1592. He studied at Grimma and Wittenberg, and became a teacher of music, poetry, and Greek at Goldberg. After returning to Wittenberg to qualify himself for the ministry, he was installed in 1572 as rector at Nordhausen, and in 1574 at Bendeleben. He acquired eminence by his erudition, by his German and Latin poems, by his German, Latin, Greek, and Hebrew editions of Luther's minor catechism, and especially by his *Grammatica Germanicæ Linguae* (Leipsic, 1578), which was one of the earliest and most thorough works of the kind. **II. Johann**, a German clergyman and poet, born in Meissen in 1616, died at Kitzingen in 1656. He studied theology at Wittenberg, and in 1647 became a teacher at Nuremberg, and in 1650 a preacher at Kitzingen. He was one of the leaders of the Nuremberg school of poetry, and with Harsdorfer founded the poetical union known as the *Pegnitzorden*. He published the *Pegnesisches Schäfergedicht* (Nuremberg, 1644), and several of his *Geistliche Trauer- und Freuden-spiele* continue to be popular.

CLALLAM, a N. W. county of Washington territory, bounded N. by the strait of Juan

de Fuca; area, 1,720 sq. m.; pop. in 1870, 408. It is watered by several streams that fall into the strait. Mount Olympus, 8,138 ft. high, the N. peak of the Olympic range, is in this county. The soil is fertile. The chief productions in 1870 were 8,636 bushels of wheat, 4,435 of oats, 3,460 of barley, 33,782 of potatoes, 1,086 tons of hay, and 19,767 lbs. of butter. The value of live stock was \$64,552. Capital, New Dungeness.

CLALLAMS, a tribe of Indians on the N. W. coast of North America, who call themselves Nusklium. They inhabit the shores of the straits of Fuca from the Okeho river to Port Townsend, bounded by the Makahs or Classets on the west and the Chemakung on the east, and live by hunting and fishing in the rivers and bays, their canoes not being fit for the sea. About 600 were scattered along the shore for about 100 miles in 1870, but they were diminishing very rapidly. A few of them, by the treaty of Point no Point, Jan. 26, 1855, were established on the Skokomish reservation in Washington territory, but not many have actually ever settled there. The Clallam language is a dialect of the Selish, but differs materially from others of the same stock.

CLAM, a common name for several species of bivalve shells. The largest of these, the giant clam, the *tridacna gigas* of Lamarek, but formerly classed in the genus *chama*, is an edible species found among the sheltered lagoons of coral islands, and imbedded in the coral; the animal sometimes weighs 20 lbs., and with the valves over 500 lbs. Such are the valves of the specimen used for *bénitiers* in the church of St. Sulpice, Paris. Sir Joseph Banks possessed one which weighed, one valve 285, and the other 222 lbs. The shell is susceptible of a fine polish, and is carved by the Chinese into snuff bottles, tops of walking sticks, and similar articles. Poets and sculp-

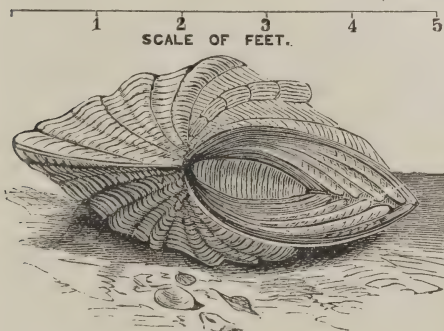
often called fresh-water clams. The *mya arenaria*, by its abundance on the coast of New England, is of importance as an article of food, and is also largely used for bait in cod and haddock fishing. They frequent soft bottoms, especially the gravelly mud of river



Soft Clam (*Mya arenaria*) and Quahaug (*Venus mercenaria*).

mouths, and are most abundant between low water and half-tide mark. The siphon is neither head nor tail, but a double retractile tube for respiratory and feeding purposes; mantle open at the opposite end, nearest the mouth, for the extrusion of the foot, by which they burrow in the mud with considerable rapidity; the shells are generally very hard, light-colored or sandy, and almost black on muddy bottoms. With the exception of the soft mass usually called the belly, they are, especially when cooked, rather indigestible. The shells are dug up from their beds, which are exposed at low water, where they are found lying about a foot below the surface, their siphon tube projecting upward in the hole by which they communicate with the water at high tide. They are taken out of the shells, or "shucked," and salted down in barrels. About 5,000 barrels are put up every year for the fisheries, and are valued at from \$6 to \$7 each. In the early history of the Plymouth colony clams were several times the principal source of sustenance for the people.

CLAMECY, a town of France, in the department of Nièvre, situated at the foot of a hill at the confluence of the Yonne and the Beuvron, 38 m. N. E. of Nevers; pop. in 1866, 5,616. The parish church is a handsome building of the end of the 15th century, with a remarkable tower and fine statuary; and the château de Vauvert is surrounded by delightful pleasure grounds. On the bridge over the Yonne is a bronze bust of a native of Clamecy, Jean Rouvet, who introduced the manufacture of wood rafts for the supply of Paris with fire wood, which are floated down the Yonne and Seine. The suburb across the former river is called Bethlehem, in honor of a bishop who was expelled from that city after its capture by the Saracens, and who, accompanying the count de Nevers to Clamecy, was endowed with the suburb and with a see which existed



Giant Clam (*Tridacna gigas*).

tors have made it the cradle of the sea goddess. The common soft clam of the northern shores is the *mya arenaria*; the hard clam or quahaug is the *venus mercenaria*; and the broad sea clam is the *maetra gigantea*. The unios, anodonts, &c., of the brooks and rivers are

till the revolution of 1789. Cloth, stationery, earthenware, and other articles are manufactured, and there are dye works, fulling mills, potteries, and many tanneries. It was formerly surrounded by stupendous walls and defended by a castle, and previous to the revolution held a prominent position in the duchy of Nevers.

CLANWILLIAM, a N. W. district of Cape Colony, S. Africa, partly traversed by the Roggeveld and other mountains, and by the Olifant river and its tributaries; area, 24,100 sq. m.; pop. in 1865, 7,041. The climate is salubrious and the soil fertile. The capital of the district is a village of the same name, 140 m. N. E. of Cape Town, whose people are chiefly employed in manufacturing hats. In the vicinity is an excellent chalybeate spring.

CLAP, Thomas, an American clergyman, born at Scituate, Mass., June 26, 1703, died in New Haven, Jan. 7, 1767. He was settled as a minister at Windham, Conn., in 1727, and in 1739 was elected president of Yale college, which office he held till 1766. He contributed much to improve Yale college, and was the means of building a college edifice and chapel. He was a man of extensive erudition, gave great attention to mathematics and astronomy, and constructed the first orrery made in this country. He published the history of Yale college, and other writings, and had made collections for a history of Connecticut; but most of his manuscripts were plundered in the expedition against New Haven under Gen. Tryon. He had a controversy with President Edwards respecting Whitefield, and opposed the latter, not so much upon religious grounds as from a misapprehension of Whitefield's designs.

CLAPAREDE, Édouard, a Swiss naturalist, born in 1832, died in 1871. He studied medicine and the natural sciences, and became professor of comparative anatomy at the academy of Geneva. His works include *De la formation et de la fécondation des œufs chez les vers nématodes* (Geneva, 1858); *Études sur les infusoires et les rhizopodes* (2 vols., 1858-'60); *Recherches anatomiques sur les annélides turbellariés, opalines et grégarines, observés dans les Hébrides* (1861); *Sur les oligochètes* (1862); *Recherches sur l'évolution des araignées* (1862); *Études sur la circulation du sang chez les aranéides du genre lycose* (1863); and *Glanures zootomiques parmi les annélides de Port-Vendres* (1864).

CLAPISSON, Louis, a French composer, born in Naples, Sept. 15, 1808, died in Paris, March 19, 1866. He was the son of a French musician established at Naples, and was educated in Paris. In 1854 he was appointed professor of music at the conservatory, and in 1861 director of a museum which he had founded and presented to the government, for the preservation of musical relics and instruments. He was distinguished as a composer of ballads, songs, and comic operas. Among his most successful operas are *La perruche* (1840), *Le*

code noir (1842), *Gibby, la cornemuse* (1846), *La fanchonette* (1856), and *Margot* (1857). His latest works were *Les trois Nicolas* (1858), and *Madame Grégoire* (1861).

CLAPP, Theodore, an American clergyman, born in Easthampton, Mass., March 29, 1792, died in Louisville, Ky., April 17, 1866. He graduated at Yale college in 1814, studied theology at Andover, and in 1822 became pastor of the first Presbyterian church in New Orleans. In 1834 he adopted Unitarian views and dissolved his connection with the Presbyterian church, but remained pastor of nearly the same congregation as before, organized under the name of the church of the Messiah. He resided in New Orleans through 20 epidemics, including yellow fever and cholera, during which he earned universal esteem by his laborious devotion to all classes of citizens. In 1847 he travelled in Europe; in 1857 he resigned his pastorate on account of ill health; and in 1858 he published a volume of "Autobiographical Sketches and Recollections" of a 35 years' residence in New Orleans.

CLAPPERTON, Hugh, a traveller in Africa, born at Annan, Scotland, in 1788, died near Sackatoo, Africa, April 13, 1827. At the age of 13 he was apprenticed to a shipmaster trading between Liverpool and New York, with whom he made a number of voyages. For an accidental violation of the excise laws he was sent on board a man-of-war, and speedily reached the rank of midshipman. He served on the American lakes during the war of 1812-'15, became lieutenant, and was placed in command of a schooner. He returned to Scotland in 1817, and remained on half pay till 1822, when he joined Dr. Oudney's expedition for the exploration of the interior of Africa. The expedition started from Moorzook, Nov. 29, 1822, and reached Lake Tchad, in the kingdom of Bornoo, Feb. 4, 1823. The distance was 800 m. Six days after entering Kuka, the capital, Clapperton and Oudney set out for Sackatoo, the capital of Houssa, more than 700 m. W. of Kuka. The journey was long and disastrous, occupying 90 days, and accompanied by many privations. When they had accomplished about a third of the distance Oudney died; and Clapperton, having reached his destination, was not suffered to proceed further westward, and after a short stay returned to Kuka, whence he proceeded in company with Major Denham to Tripoli, and thence to England. Within six months after his return he was raised to the rank of captain, equipped with the necessary men and goods for trading, and sailed for Badagry in the bight of Benin. Arriving there Dec. 7, 1825, he journeyed N. E. toward Sackatoo. Two of his companions, Capt. Pearce and Dr. Morrison, fell victims to the fatal climate within a short distance of the coast; still Clapperton, accompanied by his faithful servant Richard Lander, pressed on. At Katunga they approached the Joliba, the western and main branch of the Niger, and

crossed it without knowing that it was the stream of which they were in search. Proceeding north, they reached Kano, a considerable town, from which proceeding west they arrived again at Sackatoo. Here he was detained for more than a year by the jealousy of the native king and the intrigues of the pasha of Tripoli, until he fell a victim to dysentery. (See LANDER.)

CLARAC, Charles Othon Frédéric Jean Baptiste, count, a French antiquary and artist, born in Paris, June 16, 1777, died in 1847. Having emigrated with his family, he served for some time in the army of the prince of Condé, and afterward entered a Russian regiment; but his leisure hours were devoted to the study of natural philosophy and the fine arts. Availing himself of the amnesty granted under the consulate, he returned to France, and being chosen tutor to the children of King Murat, he repaired to Naples in 1808. During his stay there he superintended the excavations at Pompeii, the results of which he described in his *Fouilles faites à Pompéi*. After the downfall of Murat he returned to France, and soon afterward went with the French embassy to Brazil. On his return to Paris he was appointed successor to Visconti as keeper of the museum of antiquities of the Louvre. He published a catalogue of the museum, and a *Manuel de l'histoire de l'art chez les anciens* (3 vols. 12mo, 1830-'47); but his best work is the *Musée de sculpture antique et moderne* (6 vols. large 8vo, with a folio atlas, 1825-'52), completed after his death, to which he devoted his fortune.

CLARE, a central county of the southern peninsula of Michigan, drained by Maskegon and Assemoqua rivers and their branches; area, about 650 sq. m.; pop. in 1870, 366. The surface is mostly covered with forests, and diversified with small lakes. The western division of the Flint and Père Marquette railroad is to touch the S. part. The estimated value of farm productions in 1870 was \$8,808; of live stock, \$3,035. Capital, Farwell.

CLARE, a county in the west of Ireland, province of Munster, bordering on the Atlantic and the counties Galway, Tipperary, Limerick, and Kerry; area, 1,294 sq. m.; pop. in 1871, 147,994, of whom 144,589 were Catholics. It has an extensive coast line, and is rich in natural resources. Its mineral deposits are numerous—ironstone, coal, iron ore, lead, copper pyrites, manganese, black marble, slate and flag quarries, lime, and sand. Although deficient in water, and with a rugged surface, there is abundance of pasturage among the hills; while on the banks of the Shannon, which forms its southern boundary, and other spots, in which surface waters occasionally collect, there is much fine soil. Corn and provisions are the staple products, and coarse linens and woollens are made for home use. Among the numerous ancient remains of the county are round towers, the abbey built by Turlogh O'Brien in 1306 at Ennis, and the abbey of

Quin, built of black marble, in the 13th century. Capital, Ennis.

CLARE, John, an English poet, born at Helpstone, July 13, 1793, died at Northampton, May 19, 1864. He was the son of a poor farmer, and enjoyed very few advantages of early education. He began to write verses at the age of 13, but it was not till 1818 that he attracted public attention by the publication of his "Collection of Original Trifles." This led to the publication in 1820 of a volume of poems, with a brief biographical introduction, and bearing the title of "Poems Descriptive of Rural Life and Scenery, by John Clare, a Northamptonshire Peasant," which was received with general favor by the public and the reviews. In a short time numerous gifts of from £10 to £100 were bestowed upon him, and finally an annuity of £45. He married the daughter of a neighboring farmer, whom he had celebrated in several small poems. He published in 1821 "The Village Minstrel and other Poems," which was followed by the "Shepherd's Calendar and other Poems," and the "Rural Muse," which appeared in 1836. These contained some poems of rare beauty. He often described with peculiar force the impression made upon the mind by the sight of lovely objects in nature. His prosperity did not continue long after this. He fell into pecuniary embarrassment, and amid increasing difficulties sank into a state of despair and mild lunacy. He was for many years in a private asylum at Northampton.—See "Life and Remains of John Clare," by J. L. Cherry (London, 1873).

CLAREMONT, a town of Sullivan co., N. H., on the Connecticut river, 48 m. W. by N. of Concord; pop. in 1870, 4,053. The Vermont Central and the Concord, Claremont, and Contoocook railroads pass through it. There is good water power at this point, and the town contains three cotton and two woolen mills, a national bank with a capital of \$150,000, several churches, and three weekly newspapers. The Stevens high school in 1871 had 4 teachers and 85 students. Paron Stevens of New York bequeathed \$50,000 to this institution in 1872.

CLAREMONT, a palace near Windsor, England, assigned in 1816 to the princess Charlotte, on her marriage with Prince Leopold of Saxe-Coburg, who after her death in 1817 remained in possession of it, residing there till his accession to the Belgian throne, July 21, 1831. In February, 1848, he placed it at the disposal of Louis Philippe, who resided there with his family till his death in 1850, and his widow, Marie Amélie, died there in 1866. After the death of Leopold in 1865, the palace became again the property of the English crown.

CLARENDON, an E. central county of South Carolina, bounded N. E. by Lynch's creek, S. W. by the Santee river, and intersected by Black river and its tributaries; area, 700 sq. m.; pop. in 1870, 14,038, of whom 9,366 were

colored. The surface is diversified; part of the soil is fertile. The chief productions in 1870 were 218,417 bushels of Indian corn, 24,635 of peas and beans, 75,330 of sweet potatoes, 5,016 bales of cotton, and 813,012 lbs. of rice. There were 996 horses, 3,314 milch cows, 5,256 other cattle, 1,523 sheep, and 14,986 swine. Capital, Manning.

CLARENDON, Edward Hyde, earl of, a British statesman and historian, born at Dinton, Wiltshire, Feb. 18, 1608, died in Rouen, France, Dec. 9, 1674. His family belonged to the English gentry, and had for several centuries been settled in Cheshire. He was educated at Magdalen hall, Oxford (1621-'6), and had been intended for the church; but his destination was changed in consequence of the death of his elder brother, and he was entered in the Middle Temple, of which his uncle, Sir N. Hyde, was treasurer. His studies were more miscellaneous than legal, and he associated much with loose characters. He did not show application until after his marriage in 1629 with Anne Ayliffe, who died six months afterward. In 1632 he married Frances Aylesbury. The deaths of his father and uncle had a grave effect on his character, and he applied himself to professional labors, yet not neglecting literature or politics. Circumstances of a professional nature brought him the acquaintance of Archbishop Laud, then the most powerful member of the government, by whom he was much assisted, and whom he greatly assisted in return. Being chosen a member of the short parliament, which met April 13, 1640, he took the government side, though moderately, and was brought into collision with Hampden. On May 5 the parliament was dissolved by the king, a measure to which Hyde was opposed, boldly remonstrating with Laud on the subject. He was an advocate of practical reforms, and had the policy which he indicated been pursued, there can be little doubt that the British throne would have remained in possession of the house of Stuart. Hyde was chosen by Salts to serve in the long parliament, November, 1640. In the first proceedings of that celebrated body he was as conspicuous a reformer as either Pym or Hampden. He led the way in the abolition of some of those arbitrary tribunals by the use of which the Stuarts were seeking to make of England a monarchy after the fashion of France, the earl marshal's court and the council of York especially. He took part in the proceedings against the judges who had been concerned in the ship-money business, and in the impeachment of Lord Keeper Finch, distinguishing himself particularly in the latter transaction. He was not so prominently concerned in the proceedings against Strafford, but yet was active in them. In the summer of 1641 Hyde separated himself from the reformers, indications of his intention to do so having been afforded at an earlier date. He broke with them on church questions, and his decision was apparently hastened by his dis-

covery of the republican leanings of some of their chiefs. He attracted the king's attention, and they had an interview just before Charles made a visit to Scotland. From that time dates his connection with the Stuarts. He was one of those who, although opposed to arbitrary power, believed the parliament had gone far enough. The house of commons was beginning to evince an arbitrary disposition on some points, while the utter faithlessness of the king was unknown to the world. A reaction had commenced, but Charles knew not how to profit by it. The Irish rebellion and other circumstances were sufficient to set the popular tide in favor of the parliament again, when the bringing forward of the "grand remonstrance," in which all the king's crimes and errors were clearly set forth, led to a close contest in parliament, the result of which showed that the reformers were carrying matters too far, as they triumphed by only 11 majority. Hyde was very conspicuous in opposition, and narrowly escaped being sent to the tower. The king's answer to the remonstrance was written by Hyde, and is an able state paper. Sensible of Hyde's talents, the king determined to associate him with Falkland and Colepeper as his chief ministers and advisers. He refused to accept office, but the three constitutional royalists were to meet often, to consult on the king's affairs, and to conduct them in parliament, the monarch asking their advice, and solemnly pledging himself to take no step in parliament without that advice; a pledge which he kept after his usual fashion. All three were of service to him, meeting every night, generally at Hyde's house, he doing all the writing that was necessary, and corresponding with the king. The suspicions of the other party were directed to him, but this could not have proved injurious if the king had acted with common honesty. In violation of his pledge to Hyde and his associates, as well as in violation of law, he endeavored to seize the "five members," an act that not only made civil war inevitable, but set the country once more against the king. Hyde says they were absolute strangers to the royal counsels, and detested them. Still he remained the royal adviser, and aided the king with his pen. He opposed the bill to remove the bishops from the house of peers. In the dispute between the king and parliament respecting the militia, Hyde was the author of the ablest royal papers, all written in a constitutional spirit. The king had left London, and he summoned Hyde to York, to the vicinity of which he went in May, 1642. The war began three months later, but negotiations were commenced for an accommodation, and Hyde's services were put in requisition. In 1643 he was made chancellor of the exchequer, knighted, and sworn of the privy council. On the death of Falkland the king offered to make him secretary of state, but he declined the appointment. It was by his advice that parliament was summoned to

meet at Oxford, where large numbers of both houses assembled. He was one of the royal commissioners who met the parliamentary commissioners at Uxbridge, the burden of the work on the royal side falling on his shoulders. The negotiations failed. When the king appointed Prince Charles head of the western association, Hyde was made a member of the prince's council, and saw the king for the last time March 5, 1645. During the proceedings in the west he attended the prince, first to Scilly, and then to Jersey. In the latter island he remained over two years, and long after the prince had left it. In his correspondence he condemned the king's duplicity, as proved by the circumstances of Glamorgan's treaty. He commenced his "History of the Rebellion" while at Scilly, in March, 1646, and labored very diligently on it in Jersey. In the summer of 1648 he joined Prince Charles in Holland, and had some part in the intrigues of his quarrelsome court. The next year he was sent minister to Spain, in company with Lord Cottington. His mission proved a failure, and he left that country in 1651, taking up his residence at Antwerp. At the close of the year he joined Charles II. at Paris, and was intrusted with the management of his affairs. This brought him much unpopularity, and the exiled court was the scene of the worst intrigues. He suffered the extremes of poverty, and speaks in his correspondence of his lack of money, clothes, and fuel. The queen mother was his bitter enemy, and sought with the aid of the courtiers to ruin him, but without success. He was concerned in the plots against Cromwell's government, and listened to projects for the protector's assassination. He accompanied the vagrant court in all its wanderings, and was made lord chancellor in 1657. When it became apparent that a restoration was approaching, he favored moderate counsels. Two days after the entrance of the king into London, Hyde took the seat of speaker of the house of lords, and sat in the court of chancery. It was vainly attempted to exclude him from power, and he became head of the administration. He was made Baron Hyde, Viscount Cornbury, and earl of Clarendon, but refused the garter. He wished to keep faith with the roundheads, but the current ran too strongly against all who had opposed the royal power for even the king to maintain his faith. Clarendon sought to govern constitutionally, but in the spirit of a departed age. He offended the country party by his arbitrary ideas, and the court by the purity of his morals. His position in the government made him responsible for acts which he did not approve; and the sale of Dunkirk to the French caused him much unpopularity, the people derisively applying the name of Dunkirk house to the magnificent mansion which he had built in London. His taste led him to form a splendid gallery of paintings, many of which he was accused of extorting from neces-

sitous royalists. The marriage of his daughter Anne with the duke of York, heir presumptive to the crown, offended the nobility, and laid him open to grave suspicions with the ignorant portion of the people. Without being corrupt, he was greedy of money, which he expended in the most ostentatious manner. By the year 1667 his unpopularity was at its height. The people changed the name of his palace to Holland house, because of their suspicion that he had been bribed by the Dutch; and from that to Tangier hall, as he was charged with having taken money to assent to the holding of that African town, which was a part of the dower of Catharine of Braganza, queen of Charles II. The disasters of the Dutch war were laid to his charge, though he had been opposed to the contest. The great plague, the great fire, and "hard times" generally, tended to swell his unpopularity. The populace broke his windows, cut down his trees, and painted a gibbet on the gate of his house. He was hated for his virtues by the king and his mistresses; by the cavaliers, because he had upheld the act of indemnity; by the dissenters, because he had promoted the act of uniformity; and by the Catholics, because he had opposed the dispensing power. The house of lords were offended by his showing regard for the constitutional privileges of the commons; and the house of commons believed he was either opposed to the very existence of parliaments, or had advised the dissolution of the parliament then existing. The king, who always disliked extremes, recommended him to surrender the great seal; advice which he refused to take, framing his reply in language which could not fail to be offensive. Four days later (Aug. 13, 1667) he was forced to surrender the seal; but this did not satisfy his enemies, who on the meeting of parliament proceeded to extremities against him, encouraged by a reflection on him that appeared in the king's speech. It was then proposed to proceed against him by impeachment generally, but the lords refused to arrest him unless some specific charge were made. Finally, Clarendon was induced to retire to France, whereupon parliament passed a bill of banishment, and his vindication was burned by the hangman. At Evreux he was assailed by a mob of English sailors, and came near being murdered. He resided at Montpellier, Moulins, and Rouen for seven years. His retirement was devoted to literary pursuits. He completed his "History of the Rebellion," finished a work on the Psalms which he had commenced when in his first exile, wrote his "Life," an answer to Hobbes's "Leviathan," a large number of essays on political, moral, and religious subjects, a "Discourse on the Papal Power," &c. His collected writings would form almost a library, and they would show an extensive range of subjects. His "History of the Rebellion" is one of the most remarkable works in the literature of modern times. It is full of errors

of omission and commission, deliberately made. Indeed, Clarendon wrote an "apology" or "vindication" of the royal party, and not a history of the contest between that party and their opponents. Yet it has become a classic; and, to use the language of the author's descendant and biographer, "the arrangement of its materials, the dignity of its tone, the happy combination of disquisition with description, the felicity of expression which it frequently displays, the development of motives, the discrimination of character, have received the warm and merited admiration of many generations of readers."—Two of Clarendon's granddaughters, Mary and Anne, became queens regnant of England. Clarendon's "Life and Administration" has been written by T. H. Lister, one of his descendants. His "Life," and other autobiographical writings, are not to be trusted, and are inferior in value and interest to the "History of the Rebellion." It was not until more than 150 years after his death that his "History" and "Life" were published in a perfect state, for which we are indebted to the learned Dr. Bandinel.

CLARENDON, George William Frederick Villiers, fourth earl of, and Baron Hyde of Hindon, a British statesman, a descendant of the preceding through the female line, born in London, Jan. 12, 1800, died there, June 27, 1870. His earliest appointment was as commissioner of customs in Ireland. In 1833 he was appointed by Lord Grey's government envoy extraordinary and minister plenipotentiary to Spain. He filled this post, at that time one of importance and difficulty, in a manner highly creditable to himself and acceptable to the constitutional party in Spain, which was in a state of anarchy and civil war during the first years of his mission. The success with which Mr. Villiers had conducted the negotiation of a treaty for the effectual suppression of the slave trade, and the manner in which he had performed his other official duties, were warmly eulogized by Lord Palmerston in his speech on the foreign affairs of the country in April, 1837. On the decease of his uncle, the third earl, he succeeded to the peerage, Dec. 20, 1838, and returning to England in 1839 took his seat in the house of lords. He was soon called to vindicate the policy of the ministry by which he had been employed, and his own conduct as their representative in Spain, against the attacks of the marquis of Londonderry, a champion of the Carlist faction. His defence of the Spanish character and the policy of the constitutional party in Spain was so acceptable in that country, that a gold medal was struck in his honor. In 1839 Lord Clarendon became a member of the Melbourne government as lord privy seal, and in 1840 he was made chancellor of the duchy of Lancaster. He retired from the ministry on Sir Robert Peel's accession to power in 1841, but supported all the liberal measures of his government. When the repeal of the corn laws was brought forward in 1846,

Clarendon made an able speech in its support. On the change of administration, and the accession of Lord John Russell to power in 1846, Clarendon was appointed president of the board of trade, which office he filled until the death of the earl of Bessborough, May 16, 1847, who had been appointed lord lieutenant of Ireland under the same administration, when he was transferred to that office. He was at first extremely popular. His situation, however, soon became one of embarrassment. The distress produced by the famine was severe, and the measures for its mitigation adopted by the imperial parliament were attended with very limited success. Nothing within the power of the executive was neglected by Clarendon. The short-lived rebellion of Smith O'Brien followed. It was subdued with the smallest possible amount of bloodshed; but Clarendon's popularity with both parties was impaired. The disaffected looked upon him with aversion as the agent of an odious government, and the Orange faction were disgusted with his mildness. He experienced the too common fate of moderate counsels, in alienating both extremes of party. His conduct was not only unpopular with both factions in Ireland, but was severely denounced by Lord Stanley (afterward earl of Derby) in the house of lords. Clarendon on this occasion left his government in Ireland, and, appearing in his seat in parliament, vindicated his conduct. On the formation of the first Derby ministry in 1852, Clarendon was superseded by Lord Eglinton in the government of Ireland. Under Lord Aberdeen's premiership, the department of foreign affairs, after it was resigned by Lord John Russell, was intrusted to Lord Clarendon (1853), and was conducted by him with acknowledged ability. Of all Aberdeen's ministry, he retained perhaps the greatest share of the public favor, and remained in office on Lord Palmerston's accession to power. The important negotiations relative to the Crimean war and the adjustment of the balance of Europe at its close were carried on by Lord Clarendon with marked though not ostentatious vigor, and in a conciliatory spirit. He signed the treaty of alliance between Great Britain and France, April 10, 1854; remained at his post during the ministerial crisis of February, 1855; had an interview with Napoleon III. at Boulogne (March 3) on occasion of the death of the emperor Nicholas; took a prominent part in the peace conference at Paris, when he came forward as a champion of the liberal institutions of Belgium, and signed the treaties of Paris of March 30 and April 15, 1855. He was less fortunate in conducting the relations of England with the United States. The negotiations relative to Central America and the enlistment question produced a temporary coldness toward the government of the United States, and the dismissal of Mr. Crampton, the British minister at Washington. Clarendon continued to administer the foreign office till the earl of Derby

effected his return to power in 1858, when he was succeeded by the earl of Malmesbury. In 1861 he was named ambassador extraordinary to attend the coronation of King William of Prussia. In March, 1864, he rejoined Palmerston's cabinet as chancellor of the duchy of Lancaster. He afterward entered upon a private mission to the emperor Napoleon at Vichy, and as joint plenipotentiary represented England at the conference of London having for its object the cessation of hostilities between Germany and Denmark on the Schleswig-Holstein question. In November, 1865, Lord Russell having succeeded Lord Palmerston as prime minister, Clarendon again became secretary of state for foreign affairs, and continued in that office until the formation of a new government by Lord Derby in July, 1866. In the beginning of 1868 he acted as an envoy to the pope and King Victor Emanuel of Italy, to prevent if possible the impending conflict, and announced that in case of war England would maintain a friendly neutrality with France. On the accession of Mr. Gladstone to power in 1868, Lord Clarendon was again appointed foreign secretary, and retained the office till his death. In January, 1869, he resumed with the American minister, Reverdy Johnson, the negotiations which had been conducted by Lord Stanley in the matter of the Alabama claims, which were now concluded by the so-called "Johnson-Clarendon treaty." This treaty was advocated by Clarendon with great zeal in the house of lords, but was rejected almost unanimously by the senate of the United States.—His eldest son having died in 1846, he was succeeded in the earldom by his second son, EDWARD HYDE VILLIERS, born Feb. 11, 1846, who had previously represented in parliament the borough of Brecknock.

CLARENDON PARK, an extra-parochial liberty and anciently a royal forest of Wiltshire, England. In a royal palace or hunting seat here, some traces of which yet remain, Henry II. held the council which enacted in 1164 the celebrated constitutions of Clarendon, aiming to repress the power of the clergy. It gave the title of earl to Lord Chancellor Hyde.

CLARET. See FRANCE, WINES OF.

CLARETIE, Jules Arnaud, a French author, born in Limoges, Dec. 3, 1840. He was educated in Paris, and became a journalist and lecturer, but was forbidden to deliver public addresses in 1865 and again in 1868, and in the latter year he was also subjected to penalties for some of his publications on account of their ultra-republicanism. As a friend of Victor Noir he appeared as a witness in the trial of Prince Pierre Bonaparte at Tours in March, 1870. In the early part of the Franco-German war he followed the army as correspondent for the *Assemblée Nationale*, and after the downfall of the second empire he officiated for a time as chief of the communal libraries in the hôtel de ville. At the election of Feb. 8, 1871, he was defeated as a candidate for the national

assembly, and in February, 1872, he founded the *Corsaire* newspaper. He has written *Voyages d'un Parisien* (1865); *Mademoiselle Cachemire* (1867); *Les derniers montagnards*, a historical essay (1867); *La famille des gueux* and *Raymond Lindey*, dramas in which he had collaborators (1869); *Paris assiégé—tableaux et souvenirs* (1871); *Histoire de la guerre de 1870-1871* (2 vols., 1872); and *Le roman des soldats* (1872).

CLARI, Giovanni Carlo Maria, an Italian composer, born in Pisa in 1669, died in the first half of the 18th century. He studied under Colonna, became a chapelmaster, and composed in 1685 an opera, *Il savio delirante*, which was favorably received at Bologna. He composed and arranged church music, whence he was called Abbate Clari, and acquired celebrity by his chamber duets and trios, published in 1720.

CLARINET, a musical wind instrument of wood, played through a reed, with holes and keys for the fingers. Its compass extends from E below the F clef to about three octaves above, although its powers are not equal throughout. It is heard to best advantage in the keys of C and F, in which most of the music for it is written. Its invention is ascribed to Johann Christoph Denner, of Leipsic, who died in 1707.

CLARION, a N. W. county of Pennsylvania; area, 600 sq. m.; pop. in 1870, 26,537. It is bounded S. W. by Alleghany river, which is here navigable by steamboats, and intersected by the Clarion, from which it is named. The soil is good, and the surface either undulating or hilly. Bituminous coal, iron, and limestone are found in the county, and timber of various kinds is abundant. The Alleghany Valley railroad traverses it. The chief productions in 1870 were 152,172 bushels of wheat, 99,339 of rye, 251,183 of Indian corn, 607,290 of oats, 46,139 of buckwheat, 57,678 of potatoes, 28,104 tons of hay, 565,070 lbs. of butter, and 88,787 of wool. There were 6,718 horses, 7,877 milch cows, 10,858 other cattle, 29,844 sheep, and 12,908 swine. There were 27 saw mills, 16 boat-building establishments, 9 manufacturing of pig iron and castings, 5 of agricultural implements, 13 of carriages, 8 of saddlery and harness, 2 of woollen goods, 3 distilleries, 15 tanneries, and 13 currying establishments. Capital, Clarion.

CLARK, the name of five counties in the United States. **I.** A S. E. county of Mississippi, bordering on Alabama, watered by the Chickasawha river; area, 650 sq. m.; pop. in 1870, 7,505, of whom 3,432 were colored. The surface is somewhat hilly, and occupied partly by pasture lands. The Mobile and Ohio railroad passes through it. The chief productions in 1870 were 62,721 bushels of Indian corn, 1,929 of oats, 12,922 of sweet potatoes, 1,142 bales of cotton, and 9,609 lbs. of rice. There were 356 horses, 879 milch cows, 2,191 other cattle, 1,092 sheep, and 3,760 swine. There were 5 saw mills and 2 woollen mills. Capital,

Enterprise. **II.** An E. central county of Kentucky; area, 210 sq. m.; pop. in 1870, 10,882, of whom 3,715 were colored. It is bounded S. by Kentucky and Red rivers, of which the former is navigable, and the latter furnishes good water power. The surface is hilly and broken, and much of the soil exceedingly fertile. Hydraulic limestone is the principal rock. The Elizabeth, Lexington, and Big Sandy railroad is to pass through it. The chief productions in 1870 were 38,692 bushels of wheat, 36,636 of rye, 774,210 of Indian corn, 38,810 of oats, 20,161 of potatoes, 3,495 tons of hay, 137,150 lbs. of butter, and 32,886 of wool. There were 4,046 horses, 1,897 mules and asses, 3,901 milch cows, 12,879 other cattle, 8,054 sheep, and 17,328 swine. There were 5 manufactories of carriages, 1 of cheese, 1 flour mill, 4 saw mills, and 2 distilleries. Capital, Winchester. **III.** A S. W. central county of Ohio; area, 380 sq. m.; pop. in 1870, 32,070. It is intersected by Mad river, and drained by a number of smaller streams. The surface is diversified, and the soil fertile, well watered, and plentifully supplied with timber. It is traversed by the Cincinnati, Sandusky, and Cleveland railroad and its London branch, by the Pittsburgh, Cincinnati, and St. Louis road and its Xenia and Springfield branch, by the Atlantic and Great Western, and the Springfield branch of the Cleveland, Columbus, Cincinnati, and Indianapolis railroad. The chief productions in 1870 were 600,732 bushels of wheat, 1,204,559 of Indian corn, 227,994 of oats, 94,539 of potatoes, 23,561 tons of hay, 449,334 lbs. of butter, 259,742 of wool, and 233,360 of flax. There were 6,716 horses, 5,845 milch cows, 9,130 other cattle, 54,225 sheep, and 23,410 swine. There were 11 manufactories of agricultural implements, 18 of carriages and wagons, 5 of iron castings, 7 of machinery, 2 of paints, 2 of woollen goods, 16 flour mills, 4 manufactories of boots and shoes, 9 of bricks, 1 of furniture, 5 of lime, 4 of saddlery and harness, 1 of tobacco and snuff, 2 breweries, and 4 saw mills. Capital, Springfield. **IV.** An E. county of Illinois, intersected by several streams; area, 460 sq. m.; pop. in 1870, 18,719. It borders on Indiana, and is bounded S. E. by the Wabash river, here navigable by steamboats. Stone coal is found near its banks. Alternate tracts of forest and prairie land occupy the surface, and the soil, much of which is devoted to grazing purposes, is very fertile. The St. Louis, Vandalia, Terre Haute, and Indianapolis railroad passes through the county. The chief productions in 1870 were 195,118 bushels of wheat, 614,582 of Indian corn, 212,628 of oats, 49,737 of potatoes, 18,076 tons of hay, 218,799 lbs. of butter, 69,468 of wool, and 40,126 gallons of sorghum molasses. There were 6,320 horses, 4,169 milch cows, 7,134 other cattle, 23,607 sheep, and 18,771 swine. There were 18 manufactories of carriages, 8 of furniture, 2 of woollen goods, 9 flour mills, and 6 saw mills. Capital, Marshall. **V.** A W. central county of

Wisconsin, intersected by Black river, and watered by L'Eau Claire river; area, 1,548 sq. m.; pop. in 1870, 3,450. The surface is hilly, and the soil fertile. The western division of the Milwaukee and St. Paul railroad touches the S. W. corner. The chief productions in 1870 were 12,103 bushels of wheat, 9,511 of Indian corn, 34,997 of oats, 17,317 of potatoes, and 3,846 tons of hay. The value of live stock was \$127,673. There were 10 saw mills. Capital, Neilsville.

CLARK, Abraham, an American patriot, one of the signers of the Declaration of Independence, born at Elizabethtown, N. J., Feb. 15, 1726, died at Rahway, Sept. 15, 1794. Having received an excellent education, particularly in mathematics and civil law, he chose the occupations of surveying and conveyancing. He held several important local offices under the colonial government, but upon the first appearance of resistance to the aggressions of the mother country, he took an active part in sustaining the rights of the colonists. He was a member of the committee of public safety in Elizabethtown, and on June 21, 1776, was appointed by the provincial congress one of the five delegates from New Jersey to the continental congress. In November of the same year he was reelected and served as a member of the continental congress, with the exception of the session of 1779, until November, 1783. In 1788 he again took his seat in the national legislature. He was one of the commissioners in the convention which met at Annapolis, Sept. 11, 1786, for the purpose of reporting a uniform system of commercial intercourse and regulations, for ratification by the several states; and on May 8 in the following year he was appointed one of the commissioners to represent New Jersey in the convention which framed the federal constitution. Ill health prevented his attendance at the sessions of that assembly, but in 1790 he was elected a member of the second congress, and retained his seat until a short time before his death. A monument to his memory was erected in the cemetery at Rahway, July 4, 1848.

CLARK, Alvan, an American artist and optician, born in Ashfield, Mass., March 8, 1804. A farmer's boy, his self-taught skill gained for him at the age of 22 the situation of a calico engraver at Lowell. After nine years' employment in this business at various places, he became a successful portrait painter in Boston. When over 40 years of age he became interested in telescopes, and, assisted by his sons, has been very successful in producing instruments of great accuracy. No. 9 of vol. xvii. of the "Proceedings of the Royal Astronomical Society" of London contains a list of discoveries made by him with telescopes of his own manufacture. He is also the inventor of a double eyepiece, an ingenious and valuable method of measuring small celestial arcs, from 3' to 60'. In 1863 the French academy of sciences awarded to him the Lalande prize

for discovering a new star near Sirius, by means of his own great reflecting telescope.

CLARK, Davis Waggatt, D. D., an American clergyman and author, born on the island of Mount Desert, Me., Feb. 25, 1812, died in Cincinnati, May 23, 1871. He graduated at the Wesleyan university in 1836, for seven years was president of Amenia seminary, and for nine years afterward filled important situations in the Methodist church. In 1852 he became editor of the "Ladies' Repository" and of the books issued by the western book concern, Cincinnati, and in 1864 was elected bishop. Besides preaching continually, he was a frequent contributor to the "Methodist Quarterly Review," and edited 27 volumes published by the book concern. He also published an algebra (1843), "Treatise on Mental Discipline" (1848), "Fireside Readings" (5 vols., 1854), "Life and Times of Bishop Hedding" (1854), "Man Immortal" (1864), and "Sermons" (1868).

CLARK, Sir James, a British physician, born at Cullen, Banffshire, Dec. 14, 1788, died at Bagshot Park, June 29, 1870. He studied medicine at Edinburgh, and received his degree in 1817, after which he travelled in France, Switzerland, and Italy, studying the sanitary institutions of those countries. He then settled in Rome, and practised there as a physician eight years. Returning to Edinburgh, he obtained a reputation as one of the most skilful physicians of that capital, especially in diseases of the lungs. In 1826 he settled in London, and became physician-in-chief of St. George's hospital, and consulting physician of the king, the queen of the Belgians, the duchess of Kent, and the princess Victoria. On the accession of Victoria to the throne he was chosen her physician in attendance, became physician in ordinary to the prince consort, and received the title of baronet. In 1832 he was elected a fellow of the royal society, and on the establishment of the university of London he was chosen to its senate. Dr. Clark published "Medical Notes," made during his travels (1820); "The Sanitive Influence of Climate" (1829; 5th ed., 1856), which contains a clear and philosophical account of the climates resorted to by invalids, together with meteorological tables; and a "Treatise on Pulmonary Consumption" (1835).

CLARK, Jonas, an American clergyman, born at Newton, Mass., Dec. 25, 1730, died Nov. 15, 1805. He graduated at Harvard college in 1752, and afterward officiated as pastor at Lexington, Mass. It was only a few rods from his door that the first blood was shed in the revolutionary struggle, April 19, 1775. He published a sermon on the first anniversary of the battle, 1776. He was an ardent patriot, and as a preacher was distinguished for his fervor.

CLARK, Lewis Gaylord and **Willis Gaylord**, American journalists, twin brothers, born at Otisco, Onondaga co., N. Y., in 1810. In 1834 Lewis became editor of the "Knickerbocker" maga-

zine, which had been founded two years before under the charge of Charles Fenno Hoffman, and continued to be its editor for about 25 years, until just before its discontinuance. During this period he wrote the "Editor's Table" and the "Gossip with Readers and Correspondents," which formed special features of the magazine. In 1852 he published "Knick-Knacks from an Editor's Table;" and in 1855 some of the contributors to the magazine issued for his benefit a volume made up from their contributions, entitled "The Knickerbocker Gallery." He died at Piermont, N. Y., Nov. 3, 1873, where he had resided many years.—Willis, his brother, died in 1841. At the age of 20 he went to Philadelphia, where he engaged in literary enterprises, and at the time of his death was proprietor and editor of the "Philadelphia Gazette." He had furnished to the "Knickerbocker" a series of contributions under the title of "Ollapodiana," which with others of his works were collected and published in 1844, and again in 1847.

CLARK, Thomas March, D. D., an American bishop, born in Newburyport, Mass., July 4, 1812. He graduated at Yale college in 1831, studied theology at Princeton, N. J., and was licensed to preach by the presbytery in 1835. He was for a time at the Old South church in Boston; but having resolved to enter the Episcopal church, he was ordained in January, 1836, and became rector of Grace church, Boston, where he remained till 1843, when he removed to Philadelphia. In 1847 he returned to Boston, and became assistant minister of Trinity church. In 1851 he became rector of Christ's church, Hartford, Conn. Having been elected bishop of Rhode Island, he was consecrated Dec. 6, 1854, in Grace church, Providence, of which church he was rector for 12 years. Besides numerous charges, addresses, &c., Bishop Clark has published works entitled "Early Discipline and Culture" (1852), and "Primary Truths of Religion" (1869). The latter has been translated into Chinese, for the use of schools in China and Japan.

CLARKE, the name of nine counties in the United States. **I.** A N. county of Virginia, bounded N. E. by West Virginia; area, 208 sq. m.; pop. in 1870, 6,670, of whom 2,159 were colored. It is traversed by the Shenandoah, is diversified by hills, valleys, and plains, and comprises a portion of the great valley of Virginia, on the N. W. side of the Blue Ridge. The soil is very fertile. The Winchester, Potomac, and Strasburg division of the Baltimore and Ohio railroad crosses the N. W. corner. The chief productions in 1870 were 234,858 bushels of wheat, 211,028 of Indian corn, 59,618 of oats, 2,233 tons of hay, and 26,443 lbs. of wool. There were 1,769 horses, 1,499 milch cows, 3,424 other cattle, 6,248 sheep, and 5,067 swine. There were 2 grist mills, 5 saw mills, and 6 carriage factories. Capital, Berryville. **II.** A N. E. central county of Georgia, traversed by Oconee river and two of its branches;

area, about 280 sq. m.; pop. in 1870, 12,941, of whom 6,453 were colored. Granite is found in great abundance; the principal other minerals are gold, kaolin, pyrites, tourmaline, and garnets. Near the streams the land is fertile, but much of the soil in the uplands is worn out. The Athens branch of the Georgia railroad terminates at the county seat. The chief productions in 1870 were 18,103 bushels of wheat, 134,951 of Indian corn, 27,335 of oats, and 3,069 bales of cotton. There were 647 horses, 1,244 milch cows, 1,926 other cattle, 2,340 sheep, and 4,516 swine. There were 3 manufactories of cotton goods, 3 of carriages and wagons, 1 of iron castings, 2 of machinery, 1 of woollen goods, 2 grist mills, and 2 saw mills. Capital, Athens. **III.** A S. W. county of Alabama; area 1,270 sq. m.; pop. in 1870, 14,663, of whom 7,565 were colored. It is bounded W. by the Tombigbee, and S. E. by the Alabama river, both of which are here navigable by steamboats. The surface is uneven, and a considerable portion of it occupied by pine forests. Part of the soil is poor and sandy; in other places it is fertile. The chief productions in 1870 were 227,081 bushels of Indian corn, 49,550 of sweet potatoes, and 5,713 bales of cotton. There were 1,146 horses, 873 mules and asses, 3,708 milch cows, 6,921 other cattle, 4,328 sheep, and 12,646 swine. Capital, Clarks-ville. **IV.** A S. W. central county of Arkansas, bounded E. by the Washita river, and S. W. by the Little Missouri; pop. in 1870, 11,953, of whom 3,492 were colored. The former area was 941 sq. m.; but portions of Dallas and Hot Springs counties have been added to it. It is intersected by Antoine and Caddo creeks. The Washita is navigable by steamboats. The chief productions in 1870 were 4,832 bushels of wheat, 356,428 of Indian corn, and 6,531 bales of cotton. There were 1,874 horses, 767 mules and asses, 3,165 milch cows, 4,221 other cattle, 3,945 sheep, and 21,652 swine. There were 9 grist mills, 4 saw mills, and 1 leather-carrying establishment. Capital, Arkadelphia. **V.** A S. E. county of Indiana, separated from Kentucky on the S. E. by the Ohio river; area, 400 sq. m.; pop. in 1870, 24,770. The surface is mostly level, and the soil fertile. Iron, marble, limestone, and hydraulic cement are found. The Jeffersonville, Madison, and Indianapolis, the Louisville division of the Ohio and Mississippi, and the Louisville, New Albany, and Chicago railroads traverse the county. The chief productions in 1870 were 119,368 bushels of wheat, 612,192 of Indian corn, 136,295 of oats, 103,206 of potatoes, 9,020 tons of hay, 224,376 lbs. of butter, 31,030 of wool, 14,110 of tobacco, and 34,883 gallons of sorghum molasses. There were 4,475 horses, 4,024 milch cows, 4,884 other cattle, 11,787 sheep, and 22,325 swine. There were 2 manufactories of agricultural implements, 2 of boats, 3 of carriages and wagons, 2 of cars, 3 of cement, 12 of cooperage, 5 of iron castings, 3 of machinery, 7 grist mills, 5

tanneries, 7 saw mills, 7 manufactories of saddlery and harness, 8 of tin, copper, and sheet-iron ware, and 1 of woollen goods. Capital, Charleston. **VI.** A S. county of Iowa; area, 432 sq. m.; pop. in 1870, 8,735. It is drained by the South, the Whitebreast, and the east fork of Grand river. The surface is moderately uneven, and occupied mainly by prairies. The soil is generally good. The Burlington and Missouri River railroad passes through the county. The chief productions in 1870 were 125,312 bushels of wheat, 374,588 of Indian corn, 129,595 of oats, 31,863 of potatoes, 14,889 tons of hay, 203,170 lbs. of butter, and 37,209 of wool. There were 3,654 horses, 2,938 milch cows, 4,705 other cattle, 12,073 sheep, and 11,349 swine. There were 2 grist mills, 2 manufactories of saddlery and harness, and 1 of woollen goods. Capital, Osceola. **VII.** A N. E. county of Missouri; area, 516 sq. m.; pop. in 1870, 13,667, of whom 295 were colored. It is separated from Illinois by the Mississippi river, and from Iowa by the Des Moines. It has a slightly uneven surface, intersected by Fox and Wyaconda rivers, and occupied chiefly by fertile and extensive prairies, interspersed with forests of good timber. The chief productions in 1870 were 90,159 bushels of wheat, 55,336 of rye, 505,152 of Indian corn, 239,298 of oats, 33,815 of potatoes, 12,352 tons of hay, 181,507 lbs. of butter, and 60,196 of wool. There were 5,655 horses, 4,653 milch cows, 9,232 other cattle, 18,970 sheep, and 14,971 swine. Capital, Waterloo. **VIII.** A S. W. county of Kansas, bordering on the Indian territory; area, 780 sq. m.; yet unsettled. Its N. E. corner is intersected by the Nescatunga river, the S. E. corner by the Cimarron, while a branch of the latter waters its W. part. **IX.** A S. W. county of Washington territory, bounded S. and S. W. by the Columbia river, which separates it from Oregon, and watered by Yah-kotle, Cathlapootle, and Catama rivers, and other streams; area, 1,400 sq. m.; pop. in 1870, 3,081. The soil is fertile. The chief productions in 1870 were 16,735 bushels of wheat, 36,387 of oats, 30,222 of potatoes, 5,862 tons of hay, 10,944 lbs. of cheese, 86,303 of butter, and 23,144 of wool. There were 1,037 horses, 2,229 milch cows, 2,886 other cattle, 5,279 sheep, and 1,812 swine. There were 3 grist mills and 12 saw mills. Capital, Fort Vancouver.

CLARKE, Adam, LL. D., a British clergyman, born at Moybeg, Londonderry co., Ireland, in 1760 or 1762, died in London, Aug. 26, 1832. He joined the Methodist society in 1778, and soon after became a class leader and home missionary. After a short residence at the Kingswood school, in 1782 he entered the itinerant ministry, in which work he continued with few interruptions till 1805. Nearly every part of England, Ireland, Guernsey, Jersey, and the Shetland islands enjoyed his labors as a preacher and missionary. In 1805 he was appointed to London for the second time, and remained

ten years in active service as a pastor, a promoter of public charities, and a diligent student of profane and sacred literature. During the long period of his itinerant labors he had devoted much attention to oriental studies, and as early as 1798 had begun to gather materials for his "Commentary on the Bible." In 1802 he published a "Bibliographical Dictionary" (6 vols.), a work which immediately attracted the attention of scholars. Previous to his last settlement in London he had translated Sturm's "Reflections" and Fleury's "Manners of the Ancient Israelites," besides publishing "A succinct Account of Polyglot Bibles" from 1516 to 1750, and "An Account of the various Editions of the Greek Testament," from the Complutensian to that of Griesbach. On his removal to London his attainments in oriental literature directed the attention of the committee of the British and foreign Bible society to him as a fit person to superintend their publications in the oriental languages. To him was largely intrusted the preparation of their Arabic Bible. So useful were his labors in connection with this society that at the close of 1808, when the rule of the conference required his removal from London, they requested that the rule might be suspended, and he be permitted to continue his labors. This request was granted. In 1806 he had published a supplement to his "Bibliographical Dictionary," under the title of the "Bibliographical Miscellany" (2 vols.); and in 1808 appeared the first volume of his "Succession of Sacred Literature." In 1807 the university of Aberdeen conferred on him the title of A. M., and in 1808 that of LL. D. In the latter year he was intrusted by the British government with the preparation of state papers for the continuation of Rymer's *Fœdera*. On this work he labored 10 years, adding 10 folio volumes to the 20 that had already appeared. Meantime the labors upon his "Commentary" had been diligently prosecuted. The first part appeared in 1810, and in 1812 he had completed the Pentateuch and the book of Joshua. His literary attainments had now secured him membership in various learned societies at home and abroad, and his conference had honored him by thrice choosing him president of their body. The Wesleyan missionary society being organized in 1814, Clarke became the most powerful advocate of its cause, and spent much time in preaching and travelling in its interest. In 1823 he fixed his residence at Haydon hall in the vicinity of London, where he continued his labors on his "Commentary." At length, after 40 years of literary toil, the work was completed in 1826. During the period of his residence at Haydon hall he was active in the organization of Methodism in the Shetland islands, and was zealous in the promotion of various philanthropic and Christian schemes. In addition to the works already mentioned, and his "Commentaries" (6 vols. 8vo), he edited Baxter's "Christian Directory," Shuck-

ford's "Sacred and Profane History," Harmer's "Observations on various Passages of Scripture;" and published "Discourse on the Eucharist" (1808), and "Memoirs of the Wesley Family," besides numerous contributions to periodicals on subjects pertaining chiefly to oriental and Biblical literature. His "Miscellaneous Works" have been collected and published in 13 vols. 8vo.

CLARKE, Charles Cowden, an English author, born at Enfield, near London, Dec. 15, 1787, died March 20, 1877. He was an intimate associate of Lamb, Keats, and Shelley, and for more than 20 years was a favorite popular lecturer upon British poets and prose writers. He published "Nyren's Cricketer's Guide" (1833 and 1840); "Adam the Gardener," a book for the young (1834); "Tales from Chaucer" (1833 and 1870); "Riches of Chaucer" (1835 and 1870); a collection of poems entitled *Carmina Minima* (1859); "Shakespeare Characters: chiefly those subordinate" (1863); and "Molière Characters" (1865). He also wrote the "Essays on the Comic Writers of England" which appeared in the "Gentleman's Magazine" in 1871.

CLARKE, Edward Daniel, LL. D., an English traveller and mineralogist, born at Willingdon in Sussex, June 5, 1769, died in London, March 9, 1822. He was educated at Cambridge, published in 1793 travels in England, Wales, and Ireland, and afterward travelled on the continent as a tutor and travelling companion. In 1798 he was elected fellow of his college, and went to Cambridge to reside. The next year he set out as travelling companion to Mr. Cripps on a long and laborious tour through Denmark, Sweden, Lapland, Finland, Russia, Tartary, Circassia, Asia Minor, Syria, Palestine, Egypt, Greece, Turkey, Austria, Germany, and France. This journey occupied 3½ years, and he published the results in "Travels in various Countries of Europe, Asia, and Africa" (6 vols. 4to, 1810-'23; 11 vols. 8vo, 1816-'20). On his return nearly 100 valuable classical manuscripts which he had obtained during his tour, among which was a very celebrated one of the complete works of Plato, were sold to the Bodleian library. He also placed in the vestibule of the university library at Cambridge a colossal statue of Ceres, which he had brought from Eleusis, and a number of ancient marbles from other parts of Greece, for which, as well as for his eminent attainments, the university conferred on him the degree of LL. D. He took orders in 1805, in 1807 commenced a course of lectures on mineralogy, and in 1808 became the first incumbent of the professorship of mineralogy at Cambridge. His experiments in analysis of minerals by means of the oxyhydrogen blowpipe were important. His "Life and Remains" was published in 1824.

CLARKE, Henri Jacques Guillaume, count d'Hunembourg, duke de Feltre, and marshal of France, born at Landrecies, Oct. 17, 1765, died at Neuviller, Oct. 28, 1818. He had attained

the rank of brigadier general in the army when Carnot appointed him in 1795 chief of the topographical bureau in the ministry of war, where he participated in arranging the plans which contributed to the triumphs of the French armies, and was promoted to the rank of general of division. Sent by the directory to watch the movements of Bonaparte, he was fascinated by the young hero, to whom he henceforth devoted his services. He was recalled and deprived of his rank and office by the directory; but after the 18th Brumaire he was restored to his former station, and soon intrusted with several important missions. In 1804 he was appointed councillor of state and private secretary of Napoleon on military affairs, and in August, 1807, minister of war, which post he kept until April 3, 1814. His promptness in forming an army of 60,000 soldiers and sending it against the English, who had landed in the island of Walcheren in 1809, procured for him his titles of count and duke. Napoleon had always shown a great partiality for him; but after his overthrow Clarke was among the first to join the Bourbons. He was created peer of France in June, 1814, and appointed minister of war March 11, 1815, when Napoleon was marching toward Paris. Clarke, more faithful to his new than to his old master, accompanied Louis XVIII. to Ghent, and was sent on a mission to the prince of Wales. On the second restoration he was reappointed to the ministry of war, Sept. 28, 1815, received the marshal's baton July 3, 1817, and two months later resigned his post in the cabinet and retired to private life.

CLARKE, Hyde, an English engineer and author, born in London, Dec. 14, 1815. He is the son of an engineer, and devoted himself to the same profession and the literature relating to it, and to statistics. He resided for a number of years in the East, familiarizing himself with oriental languages and promoting English enterprise in India and in connection with railways in Turkey. He has lately resided in London, and is foreign secretary and secretary for comparative philology of the ethnological society, and a member of many learned associations. Among his numerous works are "Theory of Railway Investment" (1846), "Engineering of Holland" (1849), "Comparative Philology" (1858), and an English dictionary (London, 1855; new enlarged ed., 1858) and grammar; and he has lately published the result of his studies of the Caucaso-Thibetan languages and of his prehistoric and philological researches. He speaks Turkish and other eastern languages fluently, and is a person of great industry and versatility.

CLARKE, James Freeman, D. D., an American clergyman, born in Hanover, N. H., April 4, 1810. He graduated at Harvard college in 1829, and at the Cambridge divinity school in 1833; was pastor of the Unitarian church in Louisville, Ky., from 1833 to 1840, of the church of the Disciples in Boston from 1841 to

1850, and again from 1853. He translated De Wette's "Theodore" (2 vols., 1840, in Ripley's "Specimens of Foreign Literature"); wrote the "Campaign of 1812," in the "Life and Military Services of Gen. William Hull" (1846); "Eleven Weeks in Europe" (1851); "Christian Doctrine of Forgiveness" (1852); "Service Book and Hymn Book for the Church of the Disciples" (1844 and 1856); "Memoirs of the Marchioness d'Ossoli (Margaret Fuller)," in connection with R. W. Emerson and W. H. Channing (1852); "Christian Doctrine of Prayer" (1854; new ed., 1856); "The Hour which cometh and now is" (1864); "Orthodoxy, its Truths and Errors" (1866); "Steps of Belief" (1870); "Ten Great Religions" (1871); and "Common Sense in Religion" (1874). His aim in "Orthodoxy, its Truths and Errors," was to find the essential truth in a system from which he dissented, and afterward to point out its error. The purpose of the "Ten Great Religions" is to give an account of each of these, down to the latest and best knowledge of our time, to compare each religion with Christianity, and to show the truth contained in and the deficiencies of each. His "Worship of the Church of the Disciples" combines the features of responses on the part of the congregation, as in the Episcopal service, the extempore prayer of the Congregationalists, and the silent prayer of the Friends. Besides the preceding he has published many articles in various periodicals, several poems, and a number of pamphlets. In 1863 he delivered in Boston the address on the tercentenary celebration of the birth of Shakespeare. For many years he has been one of the overseers of Harvard college, and in 1872 presented a minority report to that body in favor of the admission of women to the college. In 1863 the university conferred upon him the degree of D. D.

CLARKE, John, one of the founders of Rhode Island, born in England, Oct. 8, 1609, died at Newport, April 20, 1676. He was a physician in London, and came to Massachusetts soon after its first settlement; but being one of the friends of Anne Hutchinson, he was obliged to flee with her and her associates from that colony. Proceeding to the south, they were welcomed by Roger Williams to his vicinity, formed themselves into an organization, and obtained from the Indians an island to which they gave the name of the Isle of Rhodes or Rhode Island. The settlement commenced in 1638 at Pocasset, and Mr. Clarke began to employ himself as a preacher. In 1644 he founded at Newport the second Baptist church in America, and became its pastor. Venturing a few years later to preach in the vicinity of Boston, he was arrested by an officer of the government, was called first before a parish meeting and then before the court, and was condemned for what were adjudged false teachings to pay a fine of £20, or to be publicly whipped. He was obliged to pay his fine and leave the colony. In 1651 he was sent to Eng-

land in company with Roger Williams as an agent of the colony of Rhode Island, and published there a book entitled "Ill News from New England, or a Narrative of New England's Persecution." He remained in England after the return of Williams, till at the end of a 12 years' mission he had procured a second charter for the colony, which secured to every person at all times his own judgment and conscience in matters of religious concernment. Bancroft in his history calls him "the modest and virtuous Clarke, the persevering and disinterested envoy." Upon his return in 1663 he resumed the pastorate of his church at Newport. In his will he left his farm for charitable purposes, the income of it only to be expended; and it has since produced annually about \$200.

CLARKE, John S. See supplement.

CLARKE, M'Donald, an eccentric American poet, born in New London, Conn., June 18, 1798, died in New York, March 5, 1842. For many years his blue cloak, cloth cap, erect military air, and beaming countenance made him one of the features of Broadway. He was ever in a glow of poetic revery, and always celebrating in verses the belles of the town and the topics of the day. He was familiarly known in the street and in society as the mad poet. Yet his oddities were all amiable; he had no vices, always preserved a gentility of deportment, and was a regular attendant at Grace church. His death was very melancholy. Being picked up by a policeman late at night in an apparently destitute and demented condition, he was placed in a cell of the city prison, and in the morning found drowned by the flow of water from an open faucet. He was buried in Greenwood cemetery, where a handsome monument was erected, with the inscription, "Poor M'Donald Clarke!" His poems were of various character, humorous, sentimental, and indignant, contain many touches of delicate sensibility, and have a vein of tenderness pervading all their grotesqueness and irregularity. Some of the titles of the collections are: "A Review of the Eve of Eternity, and other Poems" (1820); "The Elixir of Moonshine, by the Mad Poet" (1822); "The Gossip" (1825); "Poetic Sketches" (1825); and "The Belles of Broadway" (1833). His last poem was "A Cross and a Coronet" (1841).

CLARKE, Mary Anne, mistress of Frederick, duke of York, second son of George III., born in 1778, died at Boulogne in 1852. In 1809 she revenged herself upon her royal lover, with whom for some time she had not been on the best terms, by reporting to Col. Wardle the secrets of the duke's management of the army, of which he was commander-in-chief. On Jan. 27 of the same year the colonel brought the matter before the house of commons, of which he was a member. By a majority of 82 the duke was acquitted of the charge of personal corruption which the colonel's motion implied; yet on March 20 he tendered his resignation, as the evidence reflected severely upon his

character, his mistress having been the chief witness brought before the committee of the house of commons. Her testimony was delivered with great impudence of manner.

CLARKE, Mary Victoria Cowden, an English authoress, born in London, June 22, 1809. She is the eldest daughter of the composer and organist Vincent Novello, and sister of Clara Novello, the singer. In her youth she was the pupil and constant associate of Mary Lamb, and frequently met Shelley, Coleridge, Charles Lamb, Keats, Leigh Hunt, Hazlitt, Douglas Jerrold, and other literary celebrities of the day, to whose influence may be attributed the early development of her intellectual powers. In her 15th year she was a contributor to the magazines. In 1828 she was married to Charles Cowden Clarke, and soon commenced the "Concordance to Shakespeare," with which her name is so honorably connected. This work, after 16 years of uninterrupted labor, four of which were devoted to the correction of proofs and the supervision of the printing, was published in London in 1846, in a large octavo of 860 pages, each containing three closely printed columns, under the title of "The Complete Concordance to Shakespeare." Her services to Shakespearean literature by this publication have been widely acknowledged; and among the tokens of appreciation which have been bestowed upon her was a memorial from America, consisting of a chair ornamented with small figures of tragedy and comedy carved from the Shakespeare mulberry tree, and with a copy of the Stratford bust of the great dramatist. Nearly every state in the Union sent contributions to the gift. Mrs. Clarke is also the author of "The Adventures of Kit Bam, Mariner;" "The Girlhood of Shakespeare's Heroines;" a novel called "The Iron Cousin;" "The Song of Drop o' Wather, by Harry Wandworth Shortfellow" (1856); "World-noted Women" (1857); "Portia and other Stories of the Early Days of Shakespeare's Heroines" (1867); several translations of works on musical theory, and a great number of magazine articles, chiefly on subjects connected with dramatic literature. She finished in 1858, for an American publishing house, an edition of Shakespeare, without notes, but with a full glossary, the text of which, founded upon that of Dyce, was subjected to a rigid comparison with all others. In conjunction with her husband she produced "Many Happy Returns of the Day, a Birthday Book" (1860), and an annotated edition of "Shakespeare's Plays" (1869).

CLARKE, Samuel, D. D., an English clergyman, born at Norwich, Oct. 11, 1675, died May 17, 1729. He was educated at Cambridge, at a time when the philosophy of Descartes was still in vogue, and Clarke mastered it and also the new system of Newton. With a view of bringing the old system into disrepute, he translated and published before his 22d year Rohault on "Physics," with notes,

in which Newton's more splendid ideas were inserted. His translation was used until the university had acquired confidence in Newton's system. He afterward turned his attention to divinity, and became chaplain to Dr. More, bishop of Norwich. In 1699 he published some theological treatises of a practical nature, and afterward paraphrases of the four Gospels, which have often been printed. In 1704 he was appointed to deliver the Boyle lecture at Oxford, and selected as his subject "The Being and Attributes of God;" and on being reappointed the next year he took "The Evidences of Natural and Revealed Religion." These lectures were published and passed through several editions, giving rise to much controversy. About 1706 he translated into English Newton's "Optics," and was rewarded by the great mathematician with a present of £500. Queen Anne made him one of her chaplains and rector of St. James's, Westminster. At his taking the degree of D. D. he defended these two propositions: 1. No article of the Christian faith delivered in the Holy Scriptures is contrary to right reason; 2. Without liberty of human action there can be no religion. In 1712 he published his celebrated treatise "On the Scripture Doctrine of the Trinity." The book was censured by the lower house of convocation, and Clarke made some explanations, which seem to have given the bishops more satisfaction than the inferior clergy. In 1715 he began a friendly controversy on free will with Leibnitz, who died before it was concluded. The papers written on each side were printed in 1717, in English and French. On the death of Sir Isaac Newton the ministry offered him the place of master of the mint, but he declined the office as unsuitable to his ecclesiastical character. In 1712 he published Cæsar's Commentaries with notes, and in 1729 12 books of the Iliad, with learned notes and a Latin translation. His "Exposition of the Church Catechism" and 10 volumes of sermons were published after his death.

CLARKE, William, an American soldier, born in Virginia, Aug. 1, 1770, died in St. Louis, Mo., Sept. 1, 1838. In 1784 his father removed to Kentucky, and settled on the present site of the city of Louisville. Young Clarke early became acquainted with Indian warfare, and at the age of 18 he was appointed ensign and went into active service; and on March 7, 1792, he became a lieutenant of infantry. Appointed adjutant and quartermaster in 1793, he served till July, 1796, when he resigned on account of ill health. He soon after took up his residence in St. Louis, and in 1803 was appointed by President Jefferson second lieutenant of artillery, with orders to assume, in connection with Capt. Meriwether Lewis, the command of an exploring expedition across the Rocky mountains to the mouth of the Columbia, which left St. Louis in March, 1804. Clarke was the principal military director of the expedition, while he also rendered material as-

sistance to Capt. Lewis in the scientific arrangements. It was to his consummate knowledge of Indian habits and manners that the expedition owed its success. He was promoted to the rank of first lieutenant in January, 1806. The nomination of lieutenant colonel, offered him by the government, was negatived by the senate, and resigning, Feb. 27, 1807, he officiated as Indian agent till he was appointed by congress brigadier general for the territory of Upper Louisiana. In 1813 President Madison appointed him governor of the Missouri territory, which post he held until the organization of Missouri as a state in 1821, when, being nominated against his consent for governor of the state, he was defeated. In May, 1822, President Monroe appointed him superintendent of Indian affairs, which office he held till his death.

CLARKE'S FORK, or River, a branch of the Columbia, formed at the "Horse Plain," near the centre of Missoula co., Montana, lat. 47° 21' N., lon. 114° 38' W., by the junction of the Bitter Root river from the south and the Flathead from the north. It flows in a general N. W. direction, and joins the Columbia in Washington territory, lat. 48° 50' N., lon. 117° 45' W. At its mouth there is a fall of 15 ft., and a quarter of a mile above it passes through a deep gorge, where there is a further fall of 3 ft. About 130 m. above its mouth the river expands into a lake, 45 m. long and 10 or 15 m. wide, called Pend d'Oreille or Kalispelum. The Flathead river rises in the Rocky mountains, in British Columbia, about lat. 49° 30' N., flows S. into Montana, and for a short distance before joining Clarke's river pursues a W. course. About 50 m. above the junction is Flathead lake. The Bitter Root rises in the Big Hole mountains in the S. W. part of Montana, and flows first N., then N. W., and finally E. Its principal tributary is the Hell Gate, which rises in the Rocky mountains, about lat. 46° N., lon. 112° 30' W., and pursues a N. W. course. The total length of Clarke's river from the source of either tributary is about 650 m.

CLARKSON, Thomas, an English abolitionist, born at Wisbeach, Cambridgeshire, March 26, 1760, died at Playford Hall, Suffolk, Sept. 26, 1846. He was the son of a clergyman, and was educated at St. John's college, Cambridge. In 1786 he obtained the prize for the best Latin essay on the question, *Anne liceat invitos in servitutem dare?* ("Is it right to make men slaves against their will?"). The investigation necessary in the preparation of this essay aroused his interest in behalf of the slaves. He gave up his professional prospects, though he had already taken deacon's orders, and resolved to devote his life to the abolition of the slave trade. He translated his prize essay into English, and published a large edition for gratuitous circulation; formed the acquaintance of the American philanthropist Benezet, and of James Ramsay, Granville Sharp, and Lord Barham; procured intelligence from

every vessel lying in a British harbor which had been engaged in the slave trade; obtained specimens of the industry and manufactures of the native African tribes for exhibition; and finally caused an engraving to be made giving an accurate view of the interior of a slave ship, with its cells, gratings, and barricades for the confinement of the blacks. These measures created a powerful excitement in England on the subject of the traffic in slaves. Mr. Clarkson followed up these efforts by pamphlet after pamphlet, and in 1788 gave to the world his work on "The Impolicy of the Slave Trade." Immediately after the publication of this work he went to France to advocate the cause in that country. He there met with sympathy and encouragement from Louis XVI. and Necker, his celebrated minister, as well as from the most influential nobles and clerical dignitaries of the nation. Although he encountered great opposition in England, he soon found several zealous supporters, including Wilberforce, Whitbread, and Sturge. Whitbread, one of the wealthiest of his friends, offered to make good all injuries which any individual might suffer in his business from aiding and abetting in this movement. The struggle was a long one, and strenuously fought, both in parliament and out of it; every year Clarkson published a new assault on the slave trade, and every year the halls of parliament witnessed a fierce debate on the subject. The Pitt ministry were comparatively lukewarm in the cause. It was not till the accession of Mr. Fox and his friends to power in 1806 that the movement gained a decisive advantage. In 1807 the British government declared the slave trade thenceforth illegal, and in the succeeding year it was declared piracy by the United States. After a temporary relaxation from his labors, during which he published a "Portraiture of the Society of Friends," with which body he cherished a warm sympathy, and in 1813 a life of William Penn, Clarkson renewed his exertions. He obtained an interview with Alexander I. of Russia, and secured his influence in behalf of the extirpation of the traffic by all the nations of Europe; and as new duties arose from the overthrow of the system, in the establishment of the colony of Sierra Leone, in the recognition of the independence of Hayti and Liberia, and in the preparation for the emancipation of the slaves in Jamaica and Antigua, he contended for each with the same fervor which had animated him in his youth. He lived to witness the emancipation of the negroes in the West Indies in 1833, and to attend the great meeting in Exeter hall in 1840, held by the British anti-slavery society, of which he officiated as president until his death. His "History of the Abolition of the Slave Trade" (1808) is one of the best authorities on the subject. It has been translated into French by Bishop Grégoire under the title of *Histoire du commerce homicide appelé traité des noirs, ou cri des Africains*

contre leurs oppresseurs (8vo, 1822), and a new English edition was printed by the English anti-slavery society, with an anonymous preface by Lord Brougham (1839). A medal in honor of Clarkson was struck by his native town in 1846; Haydon and other eminent artists were employed to paint his portrait; his name was inscribed on the pedestal of David's statue of Gutenberg in Strasburg; and the city of London erected his statue in Guildhall.—See "Thomas Clarkson, a Monograph," by James Elmes (London, 1854).

CLASTIC ANATOMY. See ANATOMICAL PREPARATIONS.

CLATSOP, the N. W. county of Oregon, separated from Washington territory on the N. by the Columbia river, and bounded W. by the Pacific; area, 1,100 sq. m.; pop. in 1870, 1,255, of whom 13 were Chinese. On the E. border are mountains. It is watered by Lewis and Clarke river and other streams falling into the ocean. The soil is good and timber is abundant. The chief productions in 1870 were 2,007 bushels of oats, 15,130 of potatoes, and 683 tons of hay. There were 147 horses, 517 milch cows, 1,065 other cattle, 1,208 sheep, and 659 swine. Capital, Astoria.

CLAUDE, Jean, a French Protestant clergyman, born near Agen in 1619, died at the Hague, Jan. 13, 1687. He officiated as pastor at Nîmes and Montpellier, but owing to his opposition to the government scheme for the reunion of the Protestants and Roman Catholics, he was interdicted from preaching. He wrote against Arnauld and Nicole on the doctrine of transubstantiation, and in 1678 held a discussion with Bossuet in presence of Mlle. de Duras, a niece of Turenne, who wished to review the grounds of her faith by hearing the arguments of these distinguished champions. Bossuet published an account of the conference, which was answered by Claude. On the very morning on which the revocation of the edict of Nantes was registered at Paris, he was ordered to leave France within 24 hours. He retired to Holland, where he was received by the prince of Orange, who settled a pension upon him. The most important of his works is his *Défense de la réformation* (Rouen, 1673).

CLAUDE LORRAINE (properly LORRAIN), a landscape painter, whose real name was CLAUDE GELÉE, born in Lorraine in 1600, died in Rome, Nov. 21, 1682. He was left an orphan at 12 years of age, displayed little intelligence in his youth, and was first made acquainted with the pencil in the home of his brother, a carver of wood at Freiburg. Subsequently he went to Rome, where he devoted himself to his profession. He is supposed to have studied about two years under Godfrey Waals, during which time he became acquainted with architectural drawing and perspective. Afterward he received instruction in painting from Agostino Tassi, and about 1625 he left Rome for a pilgrimage to the shrine of Loreto, and thence set out on a tour through

Italy, spent some time in Venice, and returned to France by the way of Tyrol and Germany. He was soon employed by the duke of Lorraine, who invited him to his house and made him very advantageous offers. After a short time he returned to Italy, and established himself in Rome, where he found ample employment. One of his earliest patrons was Cardinal Bentivoglio, who presented him to Pope Urban VIII., and for whom he painted a number of beautiful works. He was now only about 30 years of age, but had so thoroughly acquired his art that he was already recognized as one of the great masters. For more than 40 years afterward Claude continued to reside in Italy, and painted until very old. He was never married. A monument was dedicated to him in 1840 in the French church at Rome, and a statue was erected to his memory at Épinal.—Claude's great success caused him to be imitated by a host of painters, whereby a vast number of pictures were palmed upon collectors as his works. In order to detect these spurious productions, and identify his own, he made drawings of such as he was commissioned to paint, which he inscribed with the names of the purchasers. At his death he left six volumes of these drawings, which he called *Libri di verità*. One set containing 200 sketches is in possession of the duke of Devonshire; they were engraved by Earlom, and published by Boydell under the title of *Liber Veritatis*. Another is in the British museum. Rome and its environs, its Tiber and Campagna, its stupendous ruins and classic memories, furnished Claude with inexhaustible subjects for his pencil. He would spend whole days in the open air studying nature, and noting every change in the skies, or the lights and shadows of the landscape. His skies are aerial and full of brilliant effect, and there is a soft atmospheric haze over his scenes. One of his most celebrated landscapes represents a little grove of the Villa Madama, near Rome, for which Pope Clement XI. offered as much gold coin as would be required to cover the surface of the painting. His favorite periods of day were at sunrise and sunset, when objects are robed in the most delicate coloring. His figures, however, are inferior, and he frequently engaged other artists to pencil them for him. England is especially rich in the works of Claude Lorraine; the national gallery of London contains a number of them, two of which, the "St. Ursula" and the "Embarkation of the Queen of Sheba," he probably never surpassed. Four of his finest paintings were taken by Napoleon from the gallery of Cassel to Paris, where they adorned Malmaison. In 1814 the czar Alexander acquired them, and they are now in St. Petersburg.

CLAUDIA QUINTA, a Roman matron of legendary fame. Being accused of incontinency, she heard the soothsayers declare that only a virtuous woman could move the vessel conveying the image of Cybele to Rome, which had grounded on a sand bank at the mouth of the

Tiber (206 B. C.). Coming forward from among the matrons who had gone to Ostia to receive the image, and calling on Cybele to vindicate her innocence, she seized the rope attached to the vessel, which immediately moved from its sandy bed and floated. Her statue was erected in the vestibule of the temple of Cybele.

CLAUDIAN (*Claudius Claudianus*), an epic poet, born at Alexandria about 365, flourished in the reigns of Theodosius the Great and his two sons, Honorius and Arcadius. His education was Greek, but when grown up to manhood he went to Rome, and attached himself to Stilicho, the virtual ruler of the West on the division of the empire, with whom he became a great favorite, arriving at high honors; the great influence he possessed is proved by a statue erected in his honor discovered at Rome in the 15th century. He returned late in life to Egypt, and probably died there. His poems are very numerous, epics, lyrics, and panegyrics. Some of his epics are the *De Raptu Proserpine*, in three cantos, not quite complete; its great defect consists in making the subject a historical event; the *Gigantomachia*, a fragment extending to 128 lines only; *De Bello Gildonico*, describing the victories of Honorius; and *De Bello Getico* or *Pollentino*, in which is described the victory of Stilicho over Alaric the Visigoth, near Pollentia, in 403. Claudian addressed many panegyrics to the distinguished men of his age, as *De Laudibus Stilichonis*, in three books, *De Bello Getico* making the fourth; three books upon the third, fourth, and sixth consulships of Honorius; and *In Rufinum*. The best edition of his works is that of the younger Burmann (Amsterdam, 1760). The first volume of a good edition by König appeared in Göttingen in 1808, and a metrical English translation of his whole works in London in 1817.

CLAUDIUS, the name of two Roman emperors. **I. Tiberius Claudius Drusus Nero Germanicus**, the fourth emperor, born at Lugdunum (Lyons), Aug. 1, 10 B. C., died A. D. 54. He was the son of Drusus and Antonia, and the grandson of Tiberius Claudius Nero and Livia, who subsequently became the wife of Augustus. In his youth he was of delicate constitution and feeble intellect, neglected and despised by his relatives, and left to the care of pedagogues, women, and slaves. He possessed, however, great industry, and became a tolerable scholar. He was 50 years old and totally inexperienced in political affairs when the murder of Caligula, A. D. 41, called him to the throne. When the timid student heard of Caligula's fate, he hid himself in a remote apartment of the palace, fearing to be the next victim. In this position he was found by a common soldier, who raised him from the ground and saluted him as emperor. Other soldiers now entered the palace and joined their comrade, and presently the despised recluse was borne to the prætorian camp, and proclaimed by the legionaries, who immediately took the oath of allegiance to

their new sovereign. His first acts were acts of mercy. The enthusiasts who had dreamed of restoring the republic were freely pardoned, while only a few of the murderers of Caligula were put to death. But soon evil counsellors alarmed him with fictitious tales of conspiracies, and continually incited him to injustice and cruelty. During his reign the southern part of Britain was subdued and converted into a Roman province, the emperor himself taking part in the conquest, and celebrating a splendid triumph in consequence of it on his return to Rome, on which occasion he obtained from the senate the surname of Britannicus. Several other wars were also waged in this reign, with the nations of Germany, Syria, and Mauritania. He constructed the famous aqueduct which was named after himself, the harbor of Ostia, and the conduit which carried the waters of Lake Fucinus to the river Liris. He was four times married. His last wife was his own niece Agrippina, who prevailed on him to set aside his son Britannicus, and to adopt hers in his stead; and who, when he repented of this act, and gave indication of his intention to annul it, killed him with poison. He was the author of several historical works, the principal of which were a history of Rome from the battle of Actium to his own times, in 41 books, and a history of Etruria, in 20 books, all lost. **II. Marcus Aurelius Claudius Gothicus**, born of humble parents in Dardania or Illyria in 214, died in 270. On the murder of Gallienus he was proclaimed emperor by the conspirators, whose choice was confirmed by the army and senate, March 24, 268. That day was signalized by a victory which the new emperor obtained over the Alemanni, in consequence of which he assumed the surname of Germanicus. The next year the Goths, having collected a vast fleet manned with over 300,000 men, entered the Euxine from one of the Scythian rivers, passed into the Ægean, and, debarking their forces on the Macedonian coast, laid siege to Thessalonica. Claudius collected a great army, and hastened to encounter the barbarians. A terrible engagement took place near Naissus (now Nissa), in which the Goths were totally defeated, with 50,000 slain. The survivors retreated to the defiles of the Hæmus, where they endeavored to make a stand against the victors; but famine, cold, and pestilence so reduced their ranks that they were soon glad to surrender on condition of having their lives spared. But the pestilence presently spread to the camp of their conquerors, and among its victims was Claudius.

CLAUDIUS, Matthias, called Asmus, or the Wandsbeck messenger (*Der Wandsbecker Bote*), from his connection with the periodical of that name, a popular German writer, born near Lübeck about 1740, died in Hamburg, Jan. 21, 1815. His poems were originally fugitive pieces which appeared from time to time in various periodicals. These he collected in 1775 and subsequent years, and gave to the

world under the title of *Asmus Omnia sua secum portans* (last ed., Hamburg, 1844). Many of his songs have been set to music. The most popular of them is the song on Rhine wine (*Rheinweinlied*), which is still sung at the German festivals. In the latter part of his life he became a convert to religious mysticism.

CLAUDIUS CÆCUS, Appius, a Roman censor, son of Claudius Appius Crassus or Crassinus, who was named dictator 337 B. C., but resigned the office because the augurs did not consider his appointment valid. Claudius Cæcus was twice curule ædile, but the odium which attaches to his name arises mainly from the arbitrariness with which he administered the censorship from 312 to 308. In order to form in the senate and among the people a party subservient to his designs, he filled up the vacancies in the senate with low plebeians and sons of freedmen (who were, however, set aside the next year), and enrolled a large number of the latter among all the tribes. After resigning his censorship, he was elected consul in 307. He was appointed *interrex* in the years 298 and 297. In the following year he was again chosen consul, and gained with Volumnius a decisive victory over the Etruscans and Samnites. He was prætor in 295, and once (in what year is unknown) he was elected dictator. The Appian road to Capua and the Appian aqueduct were built under his administration. It is believed that his secretary published the calendar and the *Legis Actiones* at his instigation. His eloquence is extolled by Livy. One of his speeches was extant in Cicero's time. He became blind (whence his surname) and crippled in his old age, and in that condition was carried into the senate, and prevailed on it to reject the terms of peace offered by Cincæas, an envoy of Pyrrhus. He was one of the earliest Roman writers known to us. Besides a poem, of which some fragments remain, he wrote a legal treatise *De Usurpationibus*, and probably also the *Actiones*, published by Flavius. He left four sons and five daughters.

CLAUDIUS CRASSUS, Appius, a Roman decemvir from 451 to 449 B. C. He belonged to the Claudii of Sabine origin, a patrician family noted for its sanguinary cruelty, and for its unrelenting opposition to the plebeians, and to laws extending their political rights. When first a consul, he opposed the Publilian law, enacted in favor of the plebeians. Afterward, when he led the legions of Rome against the enemy, he was twice defeated, the plebeians being unwilling to fight under his command. He punished many officers by flogging and death, besides ordering every tenth man to be beheaded. After the end of his consulate he opposed the revival of an agrarian law, and was sent into temporary exile. On returning he became consul for the second time, then one of the decemvirs who promulgated the ten tables, and in the following year the leading member of the new decemvirate, which added two tables to the ten. It is supposed that these

decemvirs, and Appius among them, wished to make their power perpetual; at any rate, they proved themselves arbitrary oppressors both of patricians and plebeians. On account of an inroad of the Sabines and the Æqui, the decemvirs enlisted troops, and marched against the enemy; but Appius and Opus, his colleague, remained at Rome to maintain the power of the decemvirs. Appius now fell in love with Virginia, daughter of Lucius Virginus, who was with the army, having left his daughter under the protection of Icilius. Marcus Claudius, a client of Appius, swore before the tribunal of the decemvirs that Virginia was the daughter of one of his female slaves, taken secretly by the childless wife of Virginus as her child. This scheme had been devised by Appius to bring the girl into his power. She was arrested and brought before the decemvir, who decided that she must follow her pretended master. But the people, incited by Icilius and her uncle Numitorius, threatened an outbreak, and Appius ordered Virginia to be brought to his own house, announcing that a final inquiry and decision in her case should take place the next day. During the night Virginus arrived from the camp, and appeared with Icilius and Numitorius—all three in mourning—in the forum. Appius finally adjudged the girl to his client, notwithstanding the oath and the evidence of her father, and ordered the lictors to seize and deliver her to Marcus. Virginus, seizing a knife from a butcher standing near him, stabbed his daughter, and fled to the army with Icilius and Numitorius. Two senators, Horatius and Valerius, called on the people in the city to rise against the tyrant. At the same time Virginus, Icilius, and Numitorius appealed for vengeance to the army in their camps, which, under their leading, marched upon Rome. The decemvirs resigned, and the senate decreed the restoration of the consuls and the tribunes in their stead. Appius was put in prison, and died there; according to Livy by suicide, but according to Dionysius of Halicarnassus, he was strangled by the order of the tribunes.

CLAUDIUS NERO, a Roman general, consul in B. C. 207, who inflicted a blow on the Carthaginians which contributed not a little to render the Romans victorious in the second Punic war. He was in the south of Italy contending with Hannibal, when Hasdrubal, after crossing the Alps, was advancing from the north to the assistance of his brother. Elated at having triumphed over so many difficulties, and at being on the eve of accomplishing the great object of his expedition, Hasdrubal, unconscious of danger, sent messengers to Hannibal to announce his approach. These messengers fell into the hands of the Romans, and were brought into the presence of the consul, who learned from them how imminent was the danger that hung over his country and himself. On the very day in which the messengers of Hasdrubal were seized, the consul and his legions marched

northward to form a junction with the army of Livius, and to overwhelm the Carthaginian with the combined strength of the two armies. Hasdrubal meantime, during his advance toward the south, was led by treacherous guides into an intricate and rugged region on the banks of the Metaurus, where neither his cavalry nor elephants could act, and where his army was cut to pieces and himself slain by the forces of the consuls. After this victory, which may be said to have saved Rome, Claudius Nero returned to the south with the head of Hasdrubal, which he ordered to be thrown into the camp of Hannibal as an evidence of the disaster that had at once befallen his brother, his country, and himself. Horace's *Quid debeat, o Roma, Neronibus*, was written in honor of Claudius.

CLAUDIUS NERO, Tiberius, father of the emperor Tiberius, a descendant of the preceding. He served under Julius Cæsar, and commanded the fleet which defeated that of Egypt at the Canopic mouth of the Nile (48 B. C.). He was made pontifex in place of P. Cornelius Scipio. On the murder of Cæsar he was so fearful of sharing his fate that he even proposed that his assassins should be rewarded. When the triumvirs quarrelled he fled to Perusia, where his eldest son Tiberius, the future emperor, was born; and when Perusia surrendered to Octavius, he escaped with his wife and child to Neapolis, whence he passed over to Sicily to Sextus Pompeius. Meeting with a cool reception from Pompeius, he soon departed from Sicily for Achaia, where Mark Antony was then sojourning. On the reconciliation of Antony and Octavius he returned to Rome. His wife Livia was much younger than himself, and exceedingly beautiful. Octavius saw her, became deeply enamored of her, and demanded her surrender from her husband. Claudius durst not refuse, and gave up his wife as a father would his daughter, and, when the ceremony was over, sat down to the nuptial feast with as much outward unconcern as any ordinary guest. He died soon after, leaving Octavius the guardian of his two sons.

CLAUSEL, Bertrand, count, a French soldier, born at Mirepoix, Dec. 12, 1772, died near Toulouse, April 21, 1842. He was a nephew of the revolutionist Jean Baptiste Clausel, entered the army in 1791 as sub-lieutenant, became in 1798 chief of Grouchy's staff in the so-called army of England, and accompanied Grouchy to Italy, when he prevailed upon Charles Emanuel IV. to abdicate, the latter presenting him with Douw's celebrated picture of the "Dropsical Woman," valued at 1,500,000 francs, in token of his regard for the manner in which he had acquitted himself of a difficult diplomatic task. Clausel presented the picture to the gallery of the Louvre. In 1801 he served in Santo Domingo, after which he was general of division. In 1806 he was employed in Italy, in 1808 in Dalmatia, and in 1809 he took possession of the Illyrian prov-

inces. In 1812 he distinguished himself in Spain at the disastrous battle of Salamanca, in which he was wounded, and won the name of the unfortunate hero of the Arapiles, the total destruction of the French army having been averted by his skilful retreat after he had succeeded Marmont as commander-in-chief. In 1813, on the defeat of Joseph Bonaparte at Vitoria, he enabled Soult to protect the French frontier by impeding the progress of the English army. After Napoleon's abdication at Fontainebleau he was appointed inspector general of infantry by Louis XVIII.; but he was among the first to join the emperor after his return from Elba. He was made a senator, and appointed commander of the army of the western Pyrenees, and forced the duchess of Angoulême to leave Bordeaux. After the restoration he was sentenced to death, but escaped to the United States, where he resided several years as a planter at Mobile, and where he wrote his *Exposé justificatif*. Being amnestied in 1820, he returned to France, and in 1827 was elected to the chamber of deputies. In 1830 he was for a short time commander of the French army in Algeria, in 1831 was made a marshal, and in 1835 governor general of Algeria. An unfortunate expedition against Constantine was seized upon by his enemies as a pretext for effecting his recall; but on visiting Algeria in 1838-'9 he was warmly welcomed.

CLAUSENBURG. See **CLAUSENBURG**.

CLAUSEN, Henrik Nikolai, a Danish theologian and statesman, born at Maribø, April 22, 1793, died March 28, 1877. He was the son of a celebrated preacher, and spent some time in Berlin, where Schleiermacher deeply impressed him. He became professor of theology in the university of Copenhagen, and favored a free evangelical religious development. He was president of the provincial diet from 1842 to 1846, member of the constituent assembly and of the privy council in 1848, holding the rank of a minister without portfolio, and was one of the signers of the Danish constitution, June 5, 1849. He left the cabinet in 1851, but retained his seat in the Danish diet and resumed his lectures at the university. He edited the "Periodical for Foreign Theological Literature," and published a number of theological works.

CLAUSEWITZ, Karl von, a Prussian soldier and military writer, born at Burg, June 1, 1780, died in Breslau, Nov. 16, 1831. He served in the army while a boy, and studied in the Berlin academy for young officers (1801-'3), where he attracted the attention of Gen. Scharnhorst, with whom he subsequently cooperated in the organization of the landwehr and in other military reforms. In 1806 he was adjutant of Prince Augustus, and was captured by the French. After the restoration of peace he acted till 1812 as major of the general staff, as assistant of Scharnhorst, and as military instructor of the crown prince of Prussia and of Prince Frederick of the Netherlands. He next served with distinction in the Russian army,

aided Diebitsch in concluding with York the convention of Tauroggen, and accompanied Blücher as Russian staff officer in the campaign of 1813, of which he became the historiographer at the request of Gneisenau, who was long regarded as the author of Clausewitz's *Uebersicht des Feldzugs von 1813* (Leipsic, 1814). After serving as chief of the general staff of the Russian-German legion, he assumed in 1815 the same position in the Prussian army, and became in 1818 major general and director of the military academy, and in 1831 chief of the general staff of Gneisenau's army on the Prussian-Polish frontier. He died of cholera. His most esteemed writings are *Vom Kriege, Der Feldzug von 1796 in Italien, Der Feldzug von 1815, and Ueber das Leben und den Charakter von Scharnhorst*, included in his posthumous works (*Hinterlassene Werke über Krieg und Kriegführung*, 10 vols., Berlin, 1832-'7), which rank among the best authorities on military history and science.

CLAUSTHAL, or **Klausthal**, a town of Prussia in the province of Hanover, situated on the Zellerbach, 26 m. N. E. of Göttingen; pop. in 1871, 9,138. It stands in a bleak district of the Harz mountains, on the top and slopes of a hill, about 1,800 ft. above the sea. It is regularly laid out, having been frequently burned down and rebuilt, but the houses are generally of wood. It contains a mining school supported by the government, with a good collection of models of mines and mining machinery and of minerals, a mint, a church, court house, and gymnasium. One of the mines reaches 500 ft. below the level of the Baltic, and is drained by a tunnel cut through the mountain to a distance of 6 m. The machinery of the mines is worked by water power, and every stream in the vicinity is carefully appropriated to this purpose; the various canals, which extend from mill to mill throughout the mines, have an aggregate length of 125 m. These mines have been worked since the 11th century. About 2 m. W. of Clausthal is the silver-smelting establishment, in which 13 stamping mills are used to prepare the ore for the furnace.

CLAVICHORD, or **Clarichord**, an oblong keyed instrument, now out of use, of the nature of a spinet. The strings, being partially enveloped with cloth, emitted a soft, sweet tone, whence it was sometimes called the dumb spinet.

CLAVICLE (Lat. *claviculus*, from *clavis*, a key), the collar bone, resembling in shape the Italic letter *f*. It articulates with the sternum or breast bone, at the root of the neck, and with the acromion process of the scapula, at the shoulder. The sternal extremity is thick and triangular, with a surface for articulation with the sternum; the humeral extremity is flat and spongy, with an articular face for the acromion process of the scapula. The sternal two thirds is convex anteriorly, and the humeral third concave anteriorly. The clavicle, besides giving strength to the whole shoulder, serves to prevent it from falling inward to

the side of the chest. It also protects important vessels lying behind it. Being immediately beneath the skin, it forms a sort of ridge, which is very marked in persons who are very thin. In the male the clavicles are more curved and robust than in the female.

CLAVIÈRE, Étienne, a banker of Geneva, born Jan. 27, 1735, died Dec. 8, 1793. Having established himself in Paris, he became acquainted with Mirabeau, Brissot, and other leaders of the revolutionary party, and was appointed minister of finance in March, 1792. As an opponent of the extreme measures of Robespierre, he fell with the Girondists, being arrested June 2, 1793, and to escape the guillotine stabbed himself to death. His wife poisoned herself two days afterward. He wrote on financial subjects.

CLAVIGERO, Francisco Saverio, a Mexican historian, born in Vera Cruz about 1720, died at Cesena, Italy, in October, 1793. He spent 36 years in collecting historical materials in Mexico, and acquiring the native languages, living at times entirely among the Indians, noting their traditions, and examining historical paintings, manuscripts, and monuments. After the suppression by Spain of the order of Jesuits, of which he was a member (1767), he retired to Italy, and was with other Jesuits from Spanish America assigned by the pope a residence at Cesena, where he wrote *Storia antica del Messico* (4 vols. 4to, Cesena, 1780-'83). The work evinces more research than judgment. Its great merit is its impartiality, especially in relating the story of the conquest by Cortes. An English translation of it by C. Cullen was published in 1787.

CLAVIJO, Ruy Gonzalez de, one of the ambassadors of Henry III. of Castile to Tamerlane, died in Madrid in 1412. He wrote a minute account of the whole embassy, its adventures and its results. It was first published in 1582 by Argote de Molina, an antiquary of the time of Philip II., under the title of *Historia del gran Tamerlan, &c.*, though it contained only a diary of the ambassadors, beginning in May, 1403, when they embarked at Puerto Santa Maria, near Cadiz, and ending in March, 1406, when they landed there on their return. A new and excellent edition appeared in Madrid in 1782. This work contains interesting descriptions of Constantinople, Trebizond, Teheran, and of Samarcand, where the ambassadors were sumptuously entertained by Tamerlane. Clavijo on his return to Madrid was received with distinction by the king; he was one of the witnesses of the king's will, and was buried in the convent of St. Francis. His life is to be found in vol. iv. of *Hijos de Madrid, &c.* (Madrid, 1789).

CLAVIJO Y FAXARDO, José, a Spanish author, born in the Canary islands about 1730, died in Madrid in 1806. He owes his notoriety mainly to his duel with Beaumarchais, who challenged him because Clavijo had broken his promise to marry one of his sisters to whom he had paid his addresses. By the influence of Beaumar-

chais he lost the office of keeper of the archives, which he had held in Madrid; but a few years later he was appointed editor of the official paper, *El Mercurio de Madrid*, and also officiated for some time as director of a theatre. He furnished a Spanish translation of Buffon's "Natural History," for which he was rewarded by being appointed assistant director of the museum of natural history at Madrid. His adventure with Beaumarchais's sister has been dramatized by several poets, and most successfully by Goethe, who followed, however, the unfavorable sketch in the witty Frenchman's memoirs, while Clavijo is said to have been a worthy gentleman.

CLAY, a finely levigated silico-aluminous earth, found in its natural state in beds of varying depth, and in laminae of varying thickness. It is formed by the disintegration of feldspathic rocks, and the precipitation in basins from suspension in water of the finely divided, impalpable particles. It may be to a certain extent derived from slate rocks, and in such case is only the original clay from which the slate was formed, reproduced; but the original source was feldspathic or granite rock. The aluminous minerals contained in granite rocks are feldspar, mica, and hornblende. Ordinary granite is composed of quartz, feldspar, and mica. In syenitic granite mica is partly or wholly replaced by hornblende. These minerals contain alumina in varying proportions, in combination with silica, forming silicate of alumina, and they also contain alkaline silicates, either of potassium or sodium. Mica and hornblende generally contain considerable oxide of iron, while feldspar usually yields only traces, or none. Therefore, clays which are derived from feldspar are light-colored or white, while those partially made up of decomposed mica or hornblende are dark, either bluish or red. As a rule, however, feldspar is the constituent of granite in fine clay, as the particles of the other minerals do not become so finely divided, and therefore are deposited before reaching the basin where the fine clay is formed. Clay may be formed artificially from certain decomposed granites which are found in various parts of the United States, particularly in the vicinity of Washington, D. C. These beds are often found in a sufficiently soft condition to admit of being cut with the spade to the depth of 20 or 30 ft. A mass of the excavated rock is placed in a sluice and drenched with water, which is made to run into a tank. Here the coarser portions subside, while those more finely suspended run out with the water at the top into another tank, in which again there is another separation made in a similar manner, the finest particles passing into a third tank, where after a time they are precipitated. The water is then carefully drawn off, and the clay allowed to become sufficiently dry to be cut with a spade and removed. A fine white pipe clay may be procured in this manner.—Clays have varying

physical properties, depending on the admixture of other bodies, such as sand, lime, magnesia, alkalies, oxide of iron, and organic matter. Dry clay is readily separated into laminae, which, however, especially in the more tenacious varieties, break with a conchoidal fracture. It is non-crystalline, opaque, and of varying degrees of hardness, the harder kinds being nearly of the consistency of chalk. It has a strong affinity for water, which is not destroyed by moderate baking. A new clay pipe taken into the mouth sticks to the tongue and lips by absorbing the moisture from these parts. When moistened, clay emits a peculiar smell, called argillaceous, and also has a peculiar taste, which may also be so called. Mixed with considerable water, the clays are more or less plastic, the degree depending on their purity and peculiarities of composition. When subjected to a white heat they become very hard, so that they will strike fire with steel. Those clays which have a high degree of plasticity are said to be fat or long; and when possessing but little plasticity they are called lean, meagre, or short. They all shrink considerably in drying and burning, the amount depending on the quantity of water which they contain. Pure clay or silicate of alumina is infusible, but when mixed with the alkalies or alkaline earths it becomes fusible in proportion to the admixture. The principal varieties of clay used for ceramic manufacture may be divided into refractory, to which belong porcelain clays, and fusible, as potter's clay. To these may be added limy and ochrey clays.—Porcelain clay, or kaolin (a word derived from *Kao-ling*, the name of a hill in China whence the material for making porcelain is obtained), is rather softer and more crumbly than many other kinds of clay, does not form so stiff a paste with water on account of the free silica which it contains, and adheres but slightly to the tongue. It has a specific gravity of about 2.2. When separated from free silica, it has an average composition of 47 per cent. of silica, 40 of alumina, and 13 of water, having the formula $Al_2O_3, 2SiO_2 + 2aq$ (or $Al_2O_3, 3SiO_2 + 2aq$). It may be considered as derived from potash feldspar, or orthoclase, which has the formula $K_2O, Al_2O_3, 6SiO_2$, the transformation taking place by the loss of all the potash and two thirds of the silica, and a union with two equivalents of water. Some varieties, however, have a different composition, as the kaolin of Passau in Bavaria, which contains 43.65 per cent. of silica, 35.93 of alumina, 1 of sesquioxide of iron, 0.88 of carbonate of lime, and 18.5 of water; represented by the formula $4Al_2O_3, 9SiO_2 + 12aq$. Porcelain clay from Gutenberg, near Halle, contains, according to Bley, 39.02 per cent. of silica, 45 of alumina, 0.07 of carbonate of lime, 3.32 of carbonate of magnesia, 0.19 of sesquioxide of iron, and 10 of water, having approximately the formula $2Al_2O_3, 3SiO_2 + 3aq$. The Chinese and Japanese kaolins contain about twice the proportion

of silica to alumina that is found in the above European specimens, and are whiter and more unctuous to the touch. The Cornish kaolin of England, however, has an unctuous feel, and is very white and evidently formed by the decomposition of feldspar. Potters' clay, or plastic clay, contains lime and magnesia with more or less oxide of iron, either black or red. Mixed with water, it becomes exceedingly plastic; it is the common modelling material of the sculptor. The finer varieties are used for white earthenware, and the coarser for inferior ware and for drain pipes. Pipe clay is a pure variety of potters' clay, approaching somewhat in its character to kaolin, although containing less silica, and remaining more porous after baking. Fine pipe clay is found at Poole in Dorsetshire, England, and in the isle of Purbeck. It is semi-fusible, allowing the stems to be bent while hot.—Beds of fine kaolin are found at Brandon, Vt., which is used in the manufacture of paper to give weight, and the colored varieties are used in the adulteration of paint. In New Jersey, near Woodbridge, and also at South Amboy, beds of clay are worked to great extent for the manufacture of stone ware, which also furnish an excellent material for fire brick. For this purpose they must be burned twice; that is, a certain amount of clay is burned, and then ground up with another portion to make it sufficiently plastic for moulding into forms, which are again baked. Similar deposits also compose the banks of the Delaware river between Bordentown and Burlington. They all belong to the series of upper secondary rocks, underlying the greensand beds. Common brick clay is usually obtained from alluvial deposits. The color of the brick depends upon the quantity of oxide of iron in the clay. Clay beds found in Wisconsin near Lake Michigan are so free from this coloring matter that the bricks are of a straw color.—Clay for fire brick is obtained for the most part from the coal formation. Each coal bed, with very rare exceptions, rests upon a stratum of bluish gray clay, which appears of the solidity of structure of stone, though it is found to be easily cut with a knife. It often contains some carbonaceous matter lining its seams and giving them a black color, and it abounds with the fossil stigmara roots, which are all converted into the same material as the rest of the beds. When ground to powder in a mill, and mixed with quartz sand, obtained from the sandstone beds of the same formation, it makes an excellent quality of fire brick. Old, hard-burned brick, broken up and mixed with the clay, improves its quality, causing it to retain better its shape after moulding. Such a mixture is well adapted for the manufacture of crucibles. The following are analyses of a number of the best foreign fire clays, that of Gross Almerode being the material of which Hessian crucibles are made, with the addition of an equal weight of sand, and the Stourbridge clay that of the fire brick of this name:

Constituents, dried at 100° C.	Gross Almerode.		Beaufois, Ardenne.	Brierly Hill, near Stourbridge.		Schlen- dorf.
	Berthier.	Salvetat.	Berthier.	Berthier.	Salvetat.	Salvetat.
Hygromet- ric water..	....	0.43	....	....	....	0.50
Combined water	15.2	14.00	19	10.3	17.34	16.50
Silica.....	46.5	47.50	52	63.7	45.25	45.79
Alumina....	34.9	34.37	27	20.7	28.77	28.10
Oxide of iron	8.0	1.24	2	4.0	7.72	6.55
Lime.....	....	0.50	....	....	0.47	2.00
Magnesia..	....	1.00	....	....	....	....

The clay beds of the coal formation are extensively used at Newcastle for the manufacture of large gas retorts as well as of fire brick. A number of different qualities of clay are found, all of which are from beds overlaid by coal and worked with it. Dr. Richardson gives the following analyses of these varieties:

Constituents.	1.	2.	3.	4.	5.	6.	7.
Silica.....	51.10	47.55	48.55	51.11	71.28	83.29	69.25
Alumina.....	31.35	29.50	30.25	30.40	17.75	8.10	17.90
Oxide of iron...	4.63	9.13	4.06	4.91	2.43	1.88	2.97
Lime.....	1.46	1.34	1.66	1.76	2.43	2.99	1.30
Magnesia.....	1.54	0.71	1.91	trace	2.30	3.64	7.58
Water and or- ganic matter..	10.47	12.01	10.67	12.29	6.94	3.64	7.58

—A very singular quality of clay was long ago known in Europe, which produced bricks so light and porous that they floated upon water. The clay was found in Spain, and centuries afterward in Tuscany. Its composition was: silica 65 per cent., magnesia 17, alumina 14, and lime 4. The bricks were remarkably porous, light, and such poor conductors of heat that they might be held in the hand by one end while the other was red-hot. Clay of similar properties was afterward met with in central France, which when mixed with $\frac{1}{10}$ its weight of ordinary clay produced bricks of this character. When submitted by Ehrenberg to microscopic examination, these clays were found to consist of the shelly coverings of infusoria. Such collections of these microscopic silicious shells forming beds of clay are not uncommon in this country, particularly at the bottom of peat bogs; and it is highly probable they might be in many places turned to useful account. Ehrenberg, knowing that the clay under Berlin was composed of these organic remains, concluded that it was adapted to this use, which proved to be the case. In the banks of the river Spree it is found sometimes 100 ft. thick, of a light gray color, and almost entirely made up of these little shells, of which it takes no fewer than nine to equal the diameter of a human hair.—Besides its use for brick, tiles, and earthenware, clay is applied to several other purposes, as for the manufacture of mosaic tesserae, buttons, and artificial gems; for the manufacture of alum; for clarifying sugar by the process called claying; for producing a glaze upon paper hangings; for the

construction of adobe houses; and for the fulling or scouring of woollen cloths. The clay used for this last purpose is called fullers' earth. It is of an unctuous, soft, and dull quality, and is distinguished from other clays by falling to pieces in water with a crackling noise, instead of forming a paste as other clays do. Applied to cloth, it absorbs the oil and greasy matters. Its use has for some time been gradually giving way to that of soap. Extensive as are the uses of clay in the arts, its importance in agriculture is still greater, forming as it does the most valuable component of fertile soils.

CLAY, the name of 16 counties in the United States. **I.** A central county of West Virginia, intersected by Elk river, and bounded S. E. by Twenty Mile creek; area, 400 sq. m.; pop. in 1870, 2,196, of whom 4 were colored. The surface is diversified. The chief productions in 1870 were 39,093 bushels of Indian corn, 11,497 of oats, and 274 tons of hay. The value of live stock was \$63,096. Capital, Clay Court House. **II.** A S. W. county of North Carolina, bordering on Georgia, watered by several streams; area, about 200 sq. m.; pop. in 1870, 2,461, of whom 142 were colored. The chief productions in 1870 were 6,061 bushels of wheat, 79,985 of Indian corn, 14,408 of oats, 4,618 of Irish and 5,507 of sweet potatoes, 221 tons of hay, and 13,113 lbs. of tobacco. There were 587 horses, 945 milch cows, 2,103 other cattle, 3,154 sheep, and 5,376 swine. Capital, Haysville. **III.** A S. W. county of Georgia, bounded S. by Colomoke creek, separated from Alabama by the Chattahoochee river, and watered by its tributaries; area, about 200 sq. m.; pop. in 1870, 5,493, of whom 2,849 were colored. The Fort Gaines branch of the Southwestern railroad terminates at the county seat. The surface is level and the soil fertile. The chief productions in 1870 were 85,014 bushels of Indian corn, 18,124 of sweet potatoes, and 3,220 bales of cotton. There were 375 horses, 845 milch cows, 1,549 other cattle, and 4,281 swine. There were 4 carriage factories and 1 flour mill. Capital, Fort Gaines. **IV.** A N. E. county of Florida, bounded E. by St. John's river, and watered by its affluents and by numerous lakes; area, 430 sq. m.; pop. in 1870, 2,098, of whom 399 were colored. The Florida railroad passes through the N. W. corner. The surface is level. The chief productions in 1870 were 13,188 bushels of Indian corn, 5,322 of sweet potatoes, 6,690 gallons of molasses, and 65 bales of cotton. There were 130 horses, 1,238 milch cows, 2,620 other cattle, and 1,988 swine. Capital, Green Cove Springs. **V.** An E. county of Alabama, recently formed from portions of Randolph and Talladega counties, drained by tributaries of the Coosa and Tallapoosa rivers; area, about 700 sq. m.; pop. in 1870, 9,560, of whom 737 were colored. The soil is well adapted to agriculture. The chief productions in 1870 were 38,422 bushels of wheat,

196,886 of Indian corn, 17,005 of oats, 8,209 of sweet potatoes, 1,143 bales of cotton, 123,464 lbs. of butter, and 9,005 of tobacco. There were 959 horses, 561 mules and asses, 2,580 milch cows, 2,832 other cattle, 3,924 sheep, and 10,271 swine. Capital, Ashland. **VI.** A N. W. county of Texas, separated from the Indian territory on the N. by Red river; area, 1,100 sq. m.; pop. in 1860, 109; in 1870 not returned. It is intersected by the Big and Little Wichita rivers, and also watered by tributaries of the W. fork of Trinity river. The surface is broken and hilly; the soil well adapted to wheat and other cereals as well as to stock raising. **VII.** A N. central county of Tennessee, bordering on Kentucky, and intersected by Cumberland river, organized since the census of 1870; area, about 175 sq. m. Assessed value of property in 1871, \$685,177. Capital, Butler's Landing. **VIII.** A S. E. county of Kentucky; area, about 870 sq. m.; pop. in 1870, 8,297, of whom 495 were colored. The surface is mountainous, and is intersected by the S. fork of Kentucky river. Coal and iron are found; the manufacture of salt is carried on to a great extent, and the forests are large and numerous. The chief productions in 1870 were 7,853 bushels of wheat, 281,499 of Indian corn, 25,138 of oats, 17,774 of potatoes, 295 tons of hay, 17,673 lbs. of wool, and 17,787 of tobacco. There were 1,274 horses, 2,385 milch cows, 3,606 other cattle, 9,921 sheep, and 12,776 swine. Capital, Manchester. **IX.** A S. W. county of Indiana, drained by Eel river; area, 360 sq. m.; pop. in 1870, 19,084. The surface is level, the soil productive, and there are beds of coal and of iron ore. It is traversed by the St. Louis, Vandalia, Terre Haute, and Indianapolis railroad, and by the Wabash and Erie canal. The chief productions in 1870 were 192,118 bushels of wheat, 367,654 of Indian corn, 93,068 of oats, 50,472 of potatoes, 10,558 tons of hay, 150,252 lbs. of butter, 50,965 of wool, and 31,806 gallons of sorghum molasses. There were 4,927 horses, 3,686 milch cows, 5,560 other cattle, 20,437 sheep, and 16,234 swine. There were 5 flour mills, 5 iron foundries, 8 manufactories of carriages, 4 of bricks, 4 of stone and earthen ware, 2 of woollen goods, and 11 saw mills. Capital, Bowling Green. **X.** A S. E. county of Illinois, watered by the Little Wabash river; area, 440 sq. m.; pop. in 1870, 15,875. The surface is moderately uneven and occupied by forests and fertile prairies. It is traversed by the Springfield and Illinois Southeastern, and the Ohio and Mississippi railroads; the Chicago division of the Illinois central railroad touches the N. W. corner. The chief productions in 1870 were 87,631 bushels of wheat, 1,019,994 of Indian corn, 269,945 of oats, 41,297 of potatoes, 12,963 tons of hay, 215,416 lbs. of butter, 47,546 of wool, 24,354 of honey, and 53,310 gallons of sorghum molasses. There were 5,437 horses, 3,839 milch cows, 6,555 other cattle, 20,189 sheep, and 20,109 swine. There were 5 manufactories of carriages and wag-

ons, 5 of saddlery and harness, 1 of woollen goods, 7 flour mills, and 4 saw mills. Capital, Louisville. **XI.** A N. W. county of Minnesota, separated from Dakota territory by Red river, and intersected by Buffalo river and its branches; area, 380 sq. m.; pop. in 1870, 92. The surface is mostly prairie; the soil alluvial and fertile. A branch of the St. Paul and Pacific railroad is to cross the N. E. corner. The estimated value of farm productions in 1870 was \$1,106; of live stock, \$2,085. **XII.** A N. W. county of Iowa, drained by the Little Sioux river and its branches; area, about 600 sq. m.; pop. in 1870, 1,523. The McGregor and Missouri River railroad passes through it. The chief productions in 1870 were 15,382 bushels of wheat, 12,105 of Indian corn, 13,099 of oats, 4,414 of potatoes, and 3,684 tons of hay. There were 364 horses, 404 milch cows, 762 other cattle, and 220 swine. Capital, Peterson. **XIII.** A S. E. county of Nebraska, intersected in the S. W. part by Little Blue river, and watered in the north by the W. fork of the Big Blue; area, 576 sq. m.; pop. in 1870, 54. The surface is undulating prairie, and the soil fertile. **XIV.** A W. county of Missouri, bounded S. by the Missouri river; area, 415 sq. m.; pop. in 1870, 15,564, of whom 1,846 were colored. The surface is somewhat uneven, and partly occupied by forests of oak, black walnut, ash, and other trees. The soil is fertile, and rests upon a basis of sandstone and limestone. The Cameron and Kansas City branch of the Hannibal and St. Joseph, and the western division of the North Missouri railroad traverse it, and the Lexington and St. Joseph branch of the latter touches the N. E. corner. The chief productions in 1870 were 197,214 bushels of wheat, 1,844,270 of Indian corn, 199,604 of oats, 83,277 of potatoes, 5,961 tons of hay, 253,805 lbs. of butter, 57,732 of wool, and 31,040 of tobacco. There were 5,884 horses, 1,562 mules and asses, 3,979 milch cows, 10,424 other cattle, 17,390 sheep, and 38,300 swine. There were 10 flour mills, 5 saw mills, 3 manufactories of carriages and wagons, 2 of tobacco and snuff, and 3 of woollen goods. Capital, Liberty. **XV.** A N. E. county of Kansas, intersected by Republican river and Chapman's creek; area, 660 sq. m.; pop. in 1870, 2,942. The chief productions in 1870 were 36,704 bushels of wheat, 95,145 of Indian corn, and 5,356 tons of hay. There were 1,034 horses, 1,154 milch cows, 2,044 other cattle, and 574 swine. Capital, Clay Centre. **XVI.** A S. E. county of Dakota territory, separated from Nebraska by the Missouri river, and intersected by Vermilion river; area, about 500 sq. m.; pop. in 1870, 2,621. The chief productions in 1870 were 55,602 bushels of wheat, 29,476 of Indian corn, 41,016 of oats, 19,668 of potatoes, and 8,855 tons of hay. There were 666 horses, 1,237 milch cows, 2,065 other cattle, 380 sheep, and 474 swine. Capital Vermilion.

CLAY, Cassius Marcellus, an American politician, son of Gen. Green Clay, born in Madison

co., Kentucky, Oct. 19, 1810. He graduated at Yale college in 1832, practised law in Kentucky, and was elected to the state legislature in 1835 and 1837. Removing to Lexington, he was again elected to the legislature in 1840, but was defeated in 1841 on account of his opposition to slavery. In 1844 he made a tour of the north to advocate the election of his relative Henry Clay to the presidency. In 1845 he issued in Lexington the first number of the "True American," a weekly anti-slavery newspaper; but the press was seized by a mob and sent to Cincinnati. The journal was afterward revived by Mr. Clay, who printed it in Cincinnati and published it in Lexington. Upon the breaking out of the war with Mexico in 1846, he entered the service as captain, and was taken prisoner at Encarnacion, Jan. 23, 1847. In 1848 he supported the nomination of Gen. Taylor for the presidency. The question of changing the state constitution was discussed the next year, and by the influence of Mr. Clay a large convention of emancipationists assembled at Frankfort. In 1850 he separated from the whig party and became the anti-slavery candidate for governor, receiving about 5,000 votes. On the accession of President Lincoln in 1861 he was appointed minister to Russia. Returning to the United States, he was commissioned major general of volunteers April 11, 1862, but resigned March 11, 1863, and was reappointed minister to Russia, which position he held till 1869. In 1870 he publicly supported the cause of the Cuban revolutionists, and in 1872 the election of Horace Greeley as president. A volume of his speeches, edited by Horace Greeley, was published in 1848.

CLAY, Clement Comer, an American politician, born in Madison co., Alabama, in 1819. He graduated from the law department of the university of Virginia in 1839, and was admitted to the bar of Alabama in 1840. In 1842 and 1844 he was elected to the legislature, and in 1846 judge of the county court, which office he resigned in 1848. In November, 1853, he was elected to the United States senate, and took his seat in December, 1854. In November, 1857, he was reelected for a second term of six years from March 4, 1859. In the spring of 1858 he delivered a speech in favor of the admission of Kansas under the Lecompton constitution. Later in the session he spoke in favor of a bill repealing the bounty on vessels engaged in the Newfoundland fisheries. In 1860 he was chairman of the committee on commerce. In February, 1861, he resigned his seat in the senate, and was chosen a senator in the confederate congress. In 1864 he went to Canada as one of the secret agents of the confederate government, and took part in planning the raids on the northern frontier; and in July made some unsuccessful attempts to enter upon negotiations with President Lincoln. He returned to the confederacy, but after the surrender of the armies took refuge

in Canada. Being subsequently pardoned, he resumed the practice of law in Alabama.

CLAY, Green, an American soldier, born in Powhatan co., Virginia, Aug. 14, 1757, died Oct. 31, 1826. Prompted by the example of Boone's adventurous career in Kentucky, he migrated to that district before he was 20 years of age, and entered the office of a surveyor, whose deputy he soon became; afterward he engaged in the surveying business on his own account, and by locating lands laid the foundation of a fortune. He was a representative of the Kentucky district in the Virginia legislature; was a member of the Virginia convention which ratified the federal constitution of 1789, in favor of which he spoke and voted; and was a leading member of the convention which formed the Kentucky constitution in 1799. He served for a long time in both branches of the state legislature, and was speaker of the senate. In 1813 he led 3,000 Kentucky volunteers to the relief of Gen. Harrison, then besieged in Fort Meigs by the British. He cut his way through the hostile lines, and this accession of strength to the fort forced the enemy to withdraw. Gen. Harrison left him in command of Fort Meigs, which was soon after unsuccessfully attacked by a large force of British and Indians under Gen. Proctor and the famous chief Tecumseh. For his skillful conduct of this defence, Gen. Clay received the special thanks of Gen. Harrison. At the close of the war he retired to his estate in Kentucky, and devoted the remainder of his life to agricultural pursuits.

CLAY, Henry, an American statesman, born in Hanover co., near Richmond, Virginia, April 12, 1777, died in Washington, June 29, 1852. His father, who was a Baptist preacher, died in 1782, leaving a small and encumbered property to his widow, with their seven children, of whom Henry was the fifth. His mother, a woman of decided mental force as well as of fervent piety and high moral worth, married again and emigrated to Kentucky in 1792; but Henry, having received a very limited education, remained in Richmond, and entered the office of Peter Tinsley, clerk of the high court of chancery, where he continued four years, when he began to study law under Robert Brooke, then attorney general, afterward governor of Virginia. During his clerkship he had attracted the special regard of Chancellor Wythe, who employed him as an amanuensis and directed his studies. In November, 1797, having been admitted to the bar, he removed to Lexington, Ky., where he opened an office, and soon achieved decided success, which was due in part to his winning address, and to the frank, gallant, cordial manner which was so marked in after life. He soon took part in public affairs, and in 1799, when the people of Kentucky were about to adopt a state constitution, he advocated the gradual abolition of slavery. In 1804 he was elected to the legislature, and in 1806 was

chosen to fill a vacancy in the United States senate caused by the resignation of Gen. John Adair. His first speech in that body was made to urge the erection of a bridge over the Potomac, opposite Washington; and he soon after submitted a resolution contemplating an appropriation of public lands to aid the construction of a canal around the falls of the Ohio at Louisville. He also urged upon the government the importance of promoting internal public improvements, and submitted to the senate a proposition, which was carried with but three dissenting votes, directing "the secretary of the treasury to prepare and report to the senate at their next session a plan for the application of such means as are within the power of congress to the purposes of opening roads and making canals; together with a statement of undertakings of that nature which, as objects of public improvement, may require and deserve the aid of government." Mr. Clay's fragment of a term expired with his first session; and he was again chosen in 1807 to the legislature, of which he was made speaker the next year. In December, 1808, he made a report approving the leading features of Mr. Jefferson's foreign policy, denouncing the British orders in council, and pledging to the president the enthusiastic support of Kentucky in any probable contingency. Having been stigmatized as a demagogue by Humphrey Marshall, Mr. Clay challenged his assailant. They met and fired twice, Marshall being slightly wounded at the former fire, and Clay at the latter. Their seconds then interfered, and terminated the combat. At the session of 1809-'10 Mr. Clay again appeared in the United States senate, having been elected to fill a vacancy for two years, created by the resignation of Mr. Thurston. His first speech at this session was in favor of the policy of protection. He afterward introduced a bill to enable the territory of Orleans to form a state constitution and government, and be admitted into the Union as the state of Louisiana. When the question of rechartering the first bank of the United States came up, he voted with the great mass of the younger members of his party in favor of its overthrow, and made a speech of remarkable vigor and energy against the recharter, which was frequently quoted against him after his change of views evinced in 1816. In August, 1811, he was elected a representative in congress; and on the day of his first appearance in the representatives' hall as a member, at the called session in November, he was chosen speaker by a large majority, a distinction without parallel since the meeting of the first congress. To this house the dominant party had sent, also for the first time, John C. Calhoun of South Carolina, William H. Crawford of Georgia, and Felix Grundy of Tennessee, all young, ardent, ambitious, inspired with hostility to Great Britain, and dissatisfied with the dilatory policy which the administrations of Jefferson and

Madison had pursued with regard to her. Mr. Clay constituted the committees of the house with express reference to an early declaration of war. He was one of the most zealous advocates of the bill proposing the immediate enlistment of 25,000 men, and urged the immediate construction of 10 new frigates. War having been declared, congress adjourned, July 6, 1812. During the winter session, which began Nov. 2, Mr. Clay made a speech in reply to Josiah Quincy which attracted great attention by its force and bitterness, by the vehemence of its denunciation of the federal party, its glowing eulogium on Jefferson, and its personal insolence to Quincy, whom he stigmatized as soiling the carpet on which he stood. The 13th congress was convened by the president May 24, 1813, more than six months in advance of its regular day. The war party was predominant in congress, and Mr. Clay was reelected speaker by a large majority. No effort was omitted on his part to insure and provide for a vigorous prosecution of the war. The British ministry having offered to open negotiations for peace with the United States, the proposition was readily embraced by President Madison, who designated Albert Gallatin, secretary of the treasury, and James A. Bayard, a leading federalist, as associates with John Quincy Adams in the proposed negotiations. Mr. Clay and Jonathan Russell were added after the negotiations had been formally agreed on. On Jan. 19, 1814, Mr. Clay resigned the speakership and his seat in order to sail for Europe as a peacemaker. Notwithstanding the intensity of party feeling in congress, but nine votes were recorded against the resolution of thanks for his ability and impartiality as speaker, which was now proposed and adopted. After signing the treaty at Ghent, Mr. Clay spent some months in Paris and London, and on his return to the United States in September, 1815, was warmly welcomed. During his absence he had been unanimously reelected to congress, and on the meeting of that body in December, 1815, he was once more chosen speaker without serious competition. Excepting one term (1821-'3), he continued a member of the house and its speaker till 1825. During this period his influence was exerted in behalf of the protection of domestic industry through the encouragement of American manufactures, and the development of the national resources by means of internal improvements. But on a single question, that of a national bank, he now frankly avowed that his views had been changed by the disastrous financial experiences of the late war; that he was now as decidedly favorable to such an establishment as he had formerly been hostile to it. The bill chartering the second United States bank became a law in April, 1816. Many who concurred with Mr. Clay in his change of views on this subject afterward changed back again, but he remained an advocate of a national

bank to the last. When the condition of Spanish America attracted public attention, Mr. Clay, in opposition to the policy of President Monroe and his cabinet, urged the recognition of the revolted Spanish colonies as independent states. His speeches in vindication of the South American patriots, and in advocacy of their immediate recognition as free and independent, are among his noblest congressional efforts, and contributed largely to the recognition by the government, in 1822, of the independence of the Spanish American states. He took a leading part in the discussion (1819-'21) relating to the admission of Missouri into the Union, and vehemently opposed any restrictions as to slavery in the proposed constitution of that state. On Feb. 2, 1821, he moved a reference of the subject to a select committee of 13, of which he became chairman; and on Feb. 10 he reported from a majority of that committee a compromise, which provided for the admission of Missouri under her slave constitution, on condition that she should never prohibit the migration to or settlement within her borders of any persons "who now are, or may hereafter become, citizens of any of the states of this Union." This proposition being rejected, Mr. Clay proposed a joint committee of conference from both houses. This committee reported the measure, known as the Missouri compromise, which was adopted. This provided that, in consideration of the admission of Missouri as a slave state, slavery should in all the remaining territories of the United States, N. of lat. $36^{\circ} 30'$ (the southern boundary of Missouri), be forever prohibited. Mr. Clay declined to be reelected for the following congress, but was again elected in 1823, and again chosen speaker. He now warmly seconded the efforts of Mr. Webster and others in favor of the recognition of insurgent Greece as an independent nation, which prevailed. In 1824 Mr. Clay was one of the four candidates for the presidency of the United States, and received 37 electoral votes. The electoral college having failed to give any one a majority, the election devolved upon the house, whose choice was limited to the three highest candidates, Adams, Jackson, and Crawford. Mr. Clay cast his vote in favor of John Quincy Adams. This action was denounced by his enemies as "bargain and corruption," and John Randolph stigmatized it as a "coalition of puritan with blackleg," for which language he was challenged by Mr. Clay. The parties met April 8, 1826, and exchanged two shots without effect, when, Randolph having declared that he would not fire at Clay, the duel was terminated by the seconds. Upon the accession of President Adams, March 4, 1825, Mr. Clay was appointed secretary of state. The acceptance of this position, under the circumstances, was regarded by some of his friends as injudicious, and was afterward publicly acknowledged by Mr. Clay to have been an error. Mr. Adams's reelection having

been defeated, Mr. Clay retired with him, March 4, 1829. He was again elected to the senate in 1831, and in 1832 was an unsuccessful candidate for the presidency against Andrew Jackson, receiving the votes only of six states. When a collision between federal authority and South Carolina seemed imminent on the tariff question, Mr. Clay proposed, early in the session of 1832-'3, his tariff compromise. Its leading features were: 1, submission to the necessity of a radical reduction of the tariff; and 2, to have the change effected so slowly and gradually that manufacturers might adapt themselves to and bear up against it. To this end, the bill provided for an ultimate reduction of all duties then ranging above 20 per cent. to that uniform rate, but only one tenth of the excess was to be deducted annually, so that the last instalment would only take effect in 1842. This proposition was generally acceptable, and, though opposed by Mr. Webster and not favored by President Jackson, passed both houses by large majorities. During the session of 1834-'5 the difficulty growing out of former French spoiliations on American commerce assumed a threatening aspect. Upon the failure of the government of France to make the reparation which had been agreed upon, President Jackson, in his message of December, 1834, proposed that congress should authorize him to secure the required indemnity by reprisals on French property. The proposition was referred by the senate to its committee on foreign affairs, of which Mr. Clay was chairman; and he (Jan. 6, 1835) made a report maintaining that the failure to pay had been unintentional on the part of the French ministry, and that the government would not be justified in resorting to the forcible reprisals recommended by the president. It was unanimously resolved by congress that any legislation at this time with respect to our relations with France was inexpedient; and thus the friendly relations with that country continued uninterrupted. In June, 1836, Mr. Clay, from the committee on foreign affairs, reported in favor of recognizing the independence of Texas, whenever satisfactory evidence should be received that she had a civil government in successful operation. The proposition, somewhat modified, passed both houses without opposition. In the autumn of that year he was chosen president of the American colonization society, in place of President Madison, recently deceased. During the winter following he was reelected to the senate, receiving 76 votes to 54 for James Guthrie, the administration candidate. When the financial stringency caused by the great commercial revolution of 1837 demanded congressional legislation, Mr. Clay led the opposition in the senate to the administration project of an independent treasury, and indicated his preference for a modified national bank. In February, 1839, he delivered a carefully prepared speech on

the subject of slavery, taking decided ground against the idea of immediate abolition as visionary and impracticable. In December of that year the opposition, or whig party, held a national convention to nominate candidates for president and vice president, when the names of Mr. Clay, Gen. Harrison, and Gen. Scott were submitted. A decided plurality of the delegates were in favor of Mr. Clay's nomination, but no one got a majority until, after three days' balloting, Gen. Harrison received the nomination, and after an animated canvass was elected by a great majority over Mr. Van Buren. Much feeling was evinced by the more ardent friends of Mr. Clay, not only in the convention but throughout the country; but he promptly signified his acquiescence in the choice. He remained in the senate, and was recognized in congress as the leader of the now dominant party there. Under his guidance the two houses rapidly matured and passed bills repealing the independent treasury system, incorporating instead a new bank of the United States, distributing prospectively the proceeds of the public lands among the states, and enacting a national bankrupt law. President Harrison died a month after his inauguration, and was succeeded by the vice president, John Tyler of Virginia, who vetoed the second of these measures, but indicated to his friends the outlines of a bank which would meet his approval. Such a bank was immediately chartered, but this was in turn vetoed. This second veto caused an immediate and irreparable breach between President Tyler with his supporters and the great body of the whigs who sympathized with Mr. Clay. The members of Tyler's cabinet, Mr. Webster excepted, resigned their posts. The chasm between the "Tyler men" and the "Clay whigs" grew daily wider and deeper, and the consequent reversion of power to the party so lately overwhelmed at the polls was inevitable.—In March, 1842, Mr. Clay resigned his seat in the senate, with the intention of retiring from public life; but in May, 1844, he was nominated with great unanimity for the presidency by the whig national convention. On the leading issue of the campaign, the annexation of Texas, Mr. Clay declared that he did not object to annexation *per se*, nor yet on account of slavery, but was opposed to any absorption of Texas while she should remain at war with Mexico, and her soil should continue to be claimed by that nation as a part of her territory. These sentiments were shared by a very large portion of the American people; but Mr. Polk, who was the democratic candidate for the presidency, and an avowed annexationist, was elected, receiving 170 electoral votes to 105 for Mr. Clay. Mr. Clay's name was one of the most prominent before the whig national convention which assembled in Philadelphia, June 7, 1848, but Gen. Zachary Taylor finally received the nomination. During the year 1849, the people of Kentucky having re-

solved to remodel their state constitution, Mr. Clay urged them to embody therein the principle of gradual emancipation; but they overruled this suggestion by a very decided vote, as they had done half a century before.—Mr. Clay was once more chosen in December, 1848, to the United States senate, for a full term of six years from the 4th of March ensuing, and took his seat Dec. 3, 1849, 43 years after his first appearance in that body. On Jan. 29, 1850, he submitted to the senate a proposition for "an amicable arrangement of all questions in controversy between the free and the slave states growing out of the subject of slavery." The resolutions, while maintaining the non-existence by law of slavery in the territory acquired by the United States from Mexico, declared that in establishing territorial governments in such territory congress should impose no restriction or condition on the subject of slavery. They further provided for the admission of California to the Union, without any restriction by congress as to slavery; opposed the abolition of slavery and the prohibition of the slave trade in the District of Columbia; and declared that congress had no power to prohibit or obstruct trade in slaves between the several slaveholding states, and that more effectual provision should be made for the rendition of fugitive slaves. The memorable discussion upon these questions was followed by the passage of the fugitive slave law, and of bills admitting California to the Union, organizing the territories of New Mexico and Utah without restriction as to slavery, and prohibiting the slave trade in the District of Columbia. Mr. Clay's last efforts in the senate were in favor of a revision of the tariff of 1846, with a view to additional protection, and of appropriations for internal improvements. During the session of 1851-'2, owing to feeble health, he was in his seat but a few days. He was visited in his room by Louis Kossuth, to whom he expressed sympathy for the struggles and sufferings of Hungary, but aversion to any intervention by the United States government in the sanguinary strifes of Europe. This was his last formal avowal of his sentiments on any public question. He continued to sink gradually till June 29, 1852, when he died. Congress assembled the same day, and each house immediately adjourned, after listening to an announcement of his death. The next day the event was the subject of orations by the leading members of both houses.—The bank question is often cited as the only important topic on which Mr. Clay's early impressions with regard to a true national policy were essentially changed. It should be noted that he, though among the earliest, most vehement, and persistent advocates of the war of 1812, was never during his 40 years of subsequent public service the adviser of any war whatever, but earnestly resisted every incitement to hostilities, and counselled the preservation of peace. "As a leader in a delibera-

tive body," said a political opponent in the senate, "Mr. Clay had no equal in America. In him, intellect, person, reason, eloquence, and courage united to form a character fit to command. He fired with his own enthusiasm, and controlled by his amazing will, individuals and masses."—Mr. Clay married in 1799 Lucretia Hart, who died April 6, 1864, at the age of 83 years. To them were born six daughters, of whom the last died in 1835, and five sons. Of the latter, HENRY, born in 1811, was killed at the battle of Buena Vista, Feb. 23, 1847. JAMES B., born in 1817, was a representative in congress in 1857-'9 from the district formerly represented by his father, and died in Montreal, Jan. 26, 1864. THOMAS HART, born in 1803, was appointed by President Lincoln minister to Nicaragua, and afterward to Honduras; he died at Lexington, Ky., March 18, 1871.—The speeches and writings of Mr. Clay have been published in several collections, but the most complete edition with a biography is by the Rev. Calvin Colton (6 vols., New York, 1857; revised ed., 1864).

CLAYBORNE, William, one of the settlers of Virginia, and a member of the council and secretary of that colony. In 1627 the governor of Virginia gave him authority to discover the head of Chesapeake bay, or any part of Virginia lying between lat. 34° and 41° N. In 1631 Charles I. granted him a license to make discoveries and trade. He established a trading post on Kent island in Chesapeake bay, not far from the site of the present capital of Maryland, Annapolis. A dispute soon arising between Lord Baltimore, the proprietary, and Virginia, the privy council left the parties to the course of law. Clayborne continued to claim Kent island and to repudiate the jurisdiction of the infant Maryland; and at length Lord Baltimore gave orders for his arrest. An engagement took place, April 23, 1635, between a small armed vessel cruising under the auspices of Clayborne and two vessels sent out by the Marylanders. One of the Marylanders being killed, Clayborne, although not arrested, was indicted and found guilty of murder, piracy, and sedition—constructive crimes inferred from his determined opposition and obstinate insubordination. He took refuge in the more settled part of Virginia, and his estate on Kent island was seized by the Maryland authorities as forfeited. Sir John Harvey, governor of Virginia, refusing to surrender Clayborne to the Maryland commissioners, he went over to England, accompanied by witnesses, to have the matter investigated. He presented to Charles I. a petition setting forth his grievances; and in 1638 the king severely reprimanded Lord Baltimore for having, in violation of his royal commands, ousted Clayborne from his rightful possessions in Kent island and slain several persons inhabiting there. Nevertheless, in the ensuing year the lords commissioners of plantations, with Archbishop Laud at their head, made a deci-

sion absolutely in favor of Lord Baltimore. In 1645 Clayborne at the head of a body of resolute insurgents expelled Leonard Calvert, deputy governor, and seized the reins of his diminutive government. In the following year Calvert, who in his turn had fled to Virginia, was reinstated, yet Clayborne escaped with impunity. In 1651 he was appointed by the English council of state one of the commissioners for the reduction of Virginia to obedience to the commonwealth of England, and he subsequently took part in reducing Maryland also. Shortly after Clayborne was made secretary of state of Virginia, and held that office until after the restoration, when he was succeeded by Thomas Ludwell. During Bacon's rebellion he was a member of the court martial that sat upon the trial of the rebel prisoners. He lived in the county of New Kent, and it is probable that he died there at an advanced age. As an explorer he was adventurous and indefatigable; and he was fearless, energetic, and indomitable in defence of the rights of Virginia. His descendants are numerous, and are found in various parts of the United States, and several of them have been distinguished men. The name is now spelt Claiborne.

CLAYS, Paul Jean, a Belgian painter, born in Bruges in 1819. He studied with Gudin in Paris, and has devoted himself chiefly to marine painting. His chief works comprise "The Catarina, Portuguese xebec, disabled, in sight of a French fleet," "The Entrance of Queen Victoria into the Port of Ostend," "The Coast of Flanders," "The Environs of Le Tréport," and "The Dike of Ostend."

CLAYTON. I. A W. central county of Georgia, bounded S. W. by Flint river; area, about 150 sq. m.; pop. in 1870, 5,477, of whom 1,748 were colored. The surface is diversified, and in parts the soil is fertile. It is traversed by the Macon and Western railroad; the Atlanta and West Point railroad touches the N. W. corner. The chief productions in 1870 were 13,814 bushels of wheat, 64,319 of Indian corn, 8,714 of oats, 6,924 of sweet potatoes, and 1,221 bales of cotton. There were 292 horses, 683 milch cows, 1,072 other cattle, and 2,599 swine. Capital, Jonesborough. **II.** A N. E. county of Iowa, bordering on Wisconsin, bounded E. by the Mississippi river, and intersected by Turkey river; area, about 760 sq. m.; pop. in 1870, 27,771. There are lead mines in the southeast; the woodlands are extensive, and water power is abundant. Fertile prairies occupy a great part of the surface. The McGregor and Missouri River railroad passes through it. The chief productions in 1870 were 1,073,219 bushels of wheat, 940,784 of Indian corn, 623,459 of oats, 57,254 of barley, 135,794 of potatoes, 31,290 tons of hay, 716,298 lbs. of butter, and 33,491 of wool. There were 8,988 horses, 8,761 milch cows, 11,346 other cattle, 11,891 sheep, and 29,186 swine; 10 flour mills, 10 saw mills, 11 carriage

factories, 4 of machinery, 11 of saddlery, 3 of cigars, and 6 breweries. Capital, Elkader.

CLAYTON, a village and township of Jefferson co., New York, and a port in the collection district of Cape Vincent; pop. of the township in 1870, 4,082; of the village, 1,020. It is at the terminus of the Utica and Black River railroad, on the St. Lawrence and Cham-mont rivers, and has a landing for vessels plying on the St. Lawrence.

CLAYTON, John, an American botanist, born at Fulham, England, about 1690, died in Virginia, Dec. 15, 1773. When about 20 years old he emigrated to Virginia, of which province his father had been appointed attorney general. He was educated as a physician, and was indefatigable in his botanical researches, addressing papers on the natural history of Virginia to the royal society of London, which were published in the "Philosophical Transactions." He also forwarded dried specimens of the flora of Virginia to Gronovius, who in conjunction with Linnæus published an account of a portion of them (*Flora Virginica*, parts i. and ii., Leyden, 1739-'43). The remainder were described in a third part by the son of Gronovius. Gronovius gave the name *Claytonia* to a genus of purslanes.

CLAYTON, John Middleton, an American statesman, born in Sussex co., Delaware, July 24, 1796, died at Dover, Nov. 9, 1856. He graduated at Yale college in 1815, and soon after began the practice of law in his native state, where he rapidly gained distinction. He was elected to the state legislature in 1824, and subsequently became secretary of state. In 1829 he was elected to the United States senate, and two years afterward was a member of the convention to revise the constitution of Delaware. He was reelected to the senate as a whig in 1835, but resigned his seat in 1837 to accept the appointment of chief justice of Delaware, which office he held for three years. He again served as United States senator from 1845 to 1849, when he became secretary of state in the cabinet of President Taylor, and held that post until the death of the president in July, 1850, when he was succeeded by Daniel Webster. Mr. Clayton was again elected to the senate in 1851, and continued a senator until his death. In the senate he early distinguished himself by a speech during the famous debate on Foote's resolution, which, though relating merely to the survey of the public lands, brought into discussion the whole subject of nullification. He also made an impressive argument in favor of paying the claims for French spoiliations. One of his most remarkable speeches was delivered in 1855 against the message of President Pierce vetoing the act ceding public lands for an insane asylum. While secretary of state, he negotiated in 1850 the celebrated treaty with England, known as the Clayton-Bulwer treaty, guaranteeing the neutrality of and encouragement to lines of interoceanic communication across

Nicaragua or elsewhere. In 1851 he zealously defended that treaty in the senate, and vindicated Taylor's administration, and his own character as a statesman.

CLAZOMENE (now *Kelisman*), one of the 12 cities of the Ionian confederacy (Dodecapolis), in Asia Minor, on the bay of Smyrna. It was originally built on the isthmus connecting the Ionian peninsula with the mainland, 20 m. S. W. of Smyrna, but subsequently transplanted from fear of the Persians to an island of the bay, which Alexander the Great afterward connected with the continent by a pier, remains of which are still visible. Clazomenæ was founded by the Colophonians, but its inhabitants were not exclusively Ionians. During the Peloponnesian war it belonged to the Athenian league, revolted, and returned to its allegiance. No remains of the ancient city exist, the very stones having been carried away to Smyrna and elsewhere. Near it is the modern village of Vurla, where there is an American missionary school. Anaxagoras was born here.

CLEANTHES, a Greek Stoic philosopher, born at Assus in Asia Minor about 300 B. C., died in Athens about 220. He followed the profession of an athlete, till, fleeing from a civil commotion, he arrived in Athens. Here he supported himself as a water-carrier for gardens, and began to study philosophy, working by night, and applying himself to the lessons of Crates and Zeno by day. He was a disciple of the latter for 19 years, and succeeded him as the head of the Stoic school. He was so slow of conception that he was named "the ass," so laborious that he was styled the second Hercules, and he lived so austere from his secret nocturnal labors that the areopagus summoned him to give an account of his mode of life, and then voted him a present of 10 minæ, which Zeno, however, forbade him to receive. The Athenians held him in the highest esteem, and but for his interposition would have banished a comic poet who ridiculed him on the stage. He died by voluntary starvation, when an ulcer threatened to be fatal to him. He wrote many philosophical works, only fragments of which remain. A hymn to Jupiter by him has been preserved by Stobæus, in which he recognizes one supreme God, omnipotent and eternal, who governs nature by an immutable law. It is contained with a Latin version in Cudworth's "Intellectual System." An English translation is found in F. W. Newman's work entitled "The Soul."

CLEARCHUS, a Lacedæmonian general, distinguished in the last years of the Peloponnesian war, and at its close sent to Thrace to protect the Greeks against the barbarians. Recalled by the ephors, he refused to obey, and was sentenced to death. He then went over to Cyrus the Younger, governor of Lydia and other provinces of Asia Minor, and followed him (401 B. C.) as commander of 13,000 enlisted Greek mercenaries, on his expedition against his brother Artaxerxes II. None of his fol-

lowers knew the secret aim of their long marches from province to province until they reached the plains of Babylonia, and the skill of Clearchus in leading them was as admirable as his valor. At the battle of Cunaxa Clearchus commanded the right wing of the Grecian army; and after the death of Cyrus, when the Greeks retreated fighting, he was tacitly recognized as their commander-in-chief. He and his chief officers having accepted the invitation of Tissaphernes, the Persian commander, to come to a friendly conference in his camp, they were seized, sent to the court of Artaxerxes, and put to death. Left without commanders and in despair, the Greeks were saved by Xenophon, who admirably led their retreat, no less admirably described in his *Anabasis*.

CLEAR CREEK, a N. central county of Colorado; area, about 350 sq. m.; pop. in 1870, 1,596. The surface is mountainous, the Medicine Bow range crossing the county near the centre. It is watered by South Clear creek and its tributaries. In the valleys of these streams the soil is good. Water power is plentiful. It is the principal silver-producing county of Colorado; gold is also found, gulch and placer diggings being worked to some extent. In 1870 the gold and silver ore shipped from the county amounted to \$415,066 08. Capital, Georgetown.

CLEARFIELD, a W. central county of Pennsylvania, situated mostly on the W. declivity of the Alleghany mountains; area, about 1,150 sq. m.; pop. in 1870, 25,741. The W. branch of the Susquehanna river bisects it, and near the middle of the county receives the waters of Clearfield creek. Mushannon creek runs along the S. E. boundary. The soil near the large streams is fertile, and on the uplands are good pastures and some arable tracts. The eastern part is much cut up by deep ravines, and is generally too rugged for cultivation. Bituminous coal and fire clay abound. The forests furnish large quantities of pine, oak, poplar, and cherry, which are conveyed down the rivers by means of rafts. The Tyrone and Clearfield railroad, connecting with the Pennsylvania railroad, terminates at Curwensville in this county. The chief productions in 1870 were 68,724 bushels of wheat, 52,117 of rye, 245,269 of Indian corn, 375,053 of oats, 43,426 of buckwheat, 62,059 of potatoes, 19,928 tons of hay, 451,942 lbs. of butter, and 57,072 of wool. There were 4,497 horses, 5,677 milch cows, 6,454 other cattle, 18,408 sheep, and 8,626 swine; 44 saw mills, 6 flour mills, 6 tanneries, 5 manufactories of iron castings, and 6 of tin, copper, and sheet-iron ware. Capital, Clearfield.

CLEARING HOUSE. See *BANK*, vol. ii., p. 282.

CLEAVELAND, a S. W. county of North Carolina, bordering on South Carolina, intersected by the First Broad river; area, about 660 sq. m.; pop. in 1870, 12,696, of whom 2,063 were colored. The soil is generally good; the surface is uneven, and marked by several consid-

erable elevations, the principal of which is King's mountain, near the S. E. border. Gold is found. The western division of the Wilmington, Charlotte, and Rutherford railroad is completed to the county seat. The chief productions in 1870 were 42,666 bushels of wheat, 236,252 of Indian corn, 67,794 of oats, 37,882 of sweet potatoes, 106,269 lbs. of butter, and 520 bales of cotton. There were 1,301 horses, 1,002 mules and asses, 2,577 milch cows, 4,119 other cattle, 8,026 sheep, and 10,602 swine. Capital, Shelby.

CLEAVELAND, Parker, an American mineralogist, born at Rowley, Mass., Jan. 15, 1780, died at Brunswick, Me., Oct. 15, 1858. He graduated at Harvard college in 1799, and then passed three years in teaching in Haverhill, Mass., and York, Me., being in the latter place also postmaster and clerk of the courts. He was a tutor in Harvard college from 1803 to 1805, when he was chosen professor of mathematics and natural philosophy, and lecturer on chemistry and mineralogy, in Bowdoin college, an office which with some modifications he retained till his death. Thus connected with this institution from its infancy, he instructed every class that graduated from it during more than half a century, and by his labors in science and his enthusiasm in teaching he contributed largely to its growth and eminence. He devoted himself especially to mineralogy, and traversed the surrounding country as far as the White mountains in prosecution of his researches, forming a very valuable cabinet. He contributed several papers to the journal of the American academy of arts and sciences, and in 1816 published his "Mineralogy and Geology," a work which earned for him the name of father of American mineralogy, and did much to associate this country with the scientific labors of older nations. It was upon the general system of Brongniart and Haüy, and was chiefly distinguished by the minute accuracy of its descriptions, and by the original information which it gave of the new localities of minerals. The correspondence of Prof. Cleaveland was now solicited by the most eminent scientific men, by Sir Humphry Davy, Sir David Brewster, Cuvier, Brongniart, and Haüy, and he received diplomas of membership from sixteen of the principal literary and scientific societies in Europe. Professorships were also tendered to him at different times by Harvard, Dartmouth, Princeton, and other colleges in the United States. A second and much enlarged edition of his "Mineralogy" appeared in 1822, and a third in 1856. In 1839 the presidency of the college was offered to him, which he declined; and from that time his efforts were chiefly as teacher and lecturer before the classes of the college and of the medical school connected with it. His genial enthusiasm in scientific pursuits, his clearness of perception, and severe official fidelity obtained for him remarkable success and popularity as an instructor. During the

53 years of his connection with Bowdoin college he failed on his own account of attending only three recitations or lectures. During this period he kept a meteorological journal, noting the weather at three different hours every day.

CLEBURNE, a N. E. county of Alabama, bordering on Georgia, watered by the Tallapoosa river; area, about 700 sq. m.; pop. in 1870, 8,017, of whom 576 were colored. It has been recently formed from portions of Calhoun, Randolph, and Talladega counties. The surface is uneven. Various minerals, including gold, lead, and iron, are found. The Selma, Rome, and Dalton railroad passes through the N. W. corner. The chief productions in 1870 were 36,739 bushels of wheat, 186,763 of Indian corn, 19,853 of oats, 15,679 of sweet potatoes, 873 bales of cotton, 83,965 lbs. of butter, and 10,997 of tobacco. There were 960 horses, 524 mules and asses, 1,976 milch cows, 3,665 other cattle, 3,871 sheep, and 10,659 swine. Capital, Edwardsville.

CLEEF, Jan van, a Flemish painter, born at Venloo in 1646, died in Ghent in 1716. His works are to be found in many churches of Flanders and Brabant. In Ghent, where they are very numerous, there is a fine picture by him in the convent of the Black Nuns, representing a sister of the order succoring persons stricken with the plague.

CLEEF, or Cleve, Joost van, a Flemish painter, born in Antwerp about 1485, died about 1530. His conceit and eccentricities bordered on insanity, and he went by the name of "The Fool." In fact he became insane before he died. He was nevertheless an artist of merit, and left some fine pictures in Flanders and Holland, among which one at Amsterdam, representing Bacchus with gray hair and a youthful face, is worthy of note.

CLEMATIS (Gr. κλήμα, tendril), a genus of mostly climbing and highly ornamental shrubs, belonging to the natural order *ranunculaceæ*. It is generically distinguished by having four valvate colored sepals, no petals, opposite leaves, and carpels bearing the styles as long feathery tails. It embraces more than 50 species, distributed eastward from Mexico to Japan, 9 of them being natives of North America. The flower is often odoriferous, and its color is white, yellow, violet, purple, or blue. The *C. vitalba* (Linn.), often called the traveller's joy, is a native of England, and is common throughout England and France, covering hedges and old walls with its ample pinnate leaves, and its panicles of white fragrant blossoms. Its leaves contain an acrid juice which irritates the skin, and were used by beggars in the middle ages to produce artificial and easily curable ulcers. The *C. flammula*, the most sweet-scented of the species, resembles the preceding, but has smaller leaves and flowers, and is indigenous and most abundant in the south of France. The *C. cirrhosa* is an elegant evergreen, with large greenish-white flowers, and is abundant in Spain and on the

Atlas mountains in Africa. The *C. viticella*, or blue clematis, is especially esteemed for forming trellises in gardens, and is distinguished by its beautiful purplish, bell-shaped



Clematis viticella.

blossoms hanging gracefully upon solitary peduncles. The genus *atragene* of Linnæus, embracing one American and several Siberian and Alpine plants, is by most authors made a species of clematis. Among the American species are the *C. Virginiana*, or virgin's bower, having leaves with three ovate acute leaflets, numerous white flowers in paniced clusters on axillary peduncles, climbing upon shrubs along river banks, and common throughout the United States; the *C. viorna*, or leather flower, with a very glabrous, bell-shaped,



Virgin's Bower (*Clematis Virginiana*).

purplish calyx, with fruit bearing very plumose tails, and found in rich soil in the middle and southern states; and the *C. ochroleuca*, with simple and entire leaves, silky beneath, bear-

ing single large nodding flowers, yellowish within, with erect stem, growing about a foot high, and found rarely in New York, Pennsylvania, and Virginia. All the species of *clématis* grow and blossom freely in any light soil, and they are widely used for trellis-work and for training against a wall. They may be propagated by layers, young cuttings, or seeds.

CLÉMENCEAU, Eugène. See supplement.

CLEMENS, Samuel Langhorne (MARK TWAIN), an American humorist, born at Florida, Monroe co., Missouri, Nov. 30, 1835. He attended a common school until 13 years of age, when he became an apprentice in the printing office of the "Courier" at Hannibal, Mo., and afterward worked at his trade in St. Louis, Cincinnati, Philadelphia, and New York. In 1855 he went to New Orleans, intending to take passage for Pará, to explore the Amazon, and to engage in the cacao trade; but the fact that there was no ship from New Orleans to Pará prevented the fulfilment of his plan. On his way down the Mississippi he had made friends with the pilots, and learned to steer the boat, and for the consideration of \$500 they engaged to make him a St. Louis and New Orleans pilot. He went up and down the river steering and studying the 1,275 miles of the route, and after a time received his license, and secured a situation as a pilot at \$250 a month. In 1861 his brother was appointed secretary of the territory of Nevada, and Samuel accompanied him as his private secretary. He worked in the mines for about a year, and says in his "Roughing It" that he was really worth a million dollars for just 10 days, and lost it through his own heedlessness. He then shovelled quartz in a silver mill for \$10 a week, for one week only. In the mean time he had written occasional letters to the Virginia City "Enterprise," and in the winter of 1862 he became city editor of that journal, and held the position for three years. Part of the time he reported legislative proceedings from Carson, summing up results in weekly letters to the "Enterprise," which he signed "Mark Twain." The name was a reminiscence of his steamboat days on the Mississippi, where it is the leadman's term to signify a depth of two fathoms of water. From Virginia City he went to San Francisco, and for five months was a reporter for the "Morning Call" newspaper. He then went to Calaveras county, and worked in the surface gold diggings for three months without result. Returning to San Francisco, he supported himself by newspaper work for several months. In 1866 he went to the Hawaiian Islands, remaining six months, and coming back with a high reputation, which he turned to account as a lecturer in San Francisco and through California and Nevada. He then went to the east and published "The Jumping Frog and other Sketches" (New York, 1867), which was republished in London. In the same year he embarked with a large party of travellers in the steamer

Quaker City on a pleasure excursion up the Mediterranean to Egypt and the Holy Land. Of this excursion he gave a humorous account in "The Innocents Abroad" (8vo, Hartford, 1869), of which 125,000 copies were sold in three years. He was for some time editor of a daily newspaper in Buffalo, but afterward resumed lecturing, and visited England in 1872 and 1873. His residence is at Hartford. In 1872 he published "Roughing It" (8vo, Hartford), which reached a sale of 91,000 copies in nine months. A London publisher has gathered all his sketches, many of which have not been collected in America (adding, however, many papers not written by Mark Twain), and has issued them in 4 vols. "Roughing It" and "The Innocents Abroad" have also been republished in London. Editions of all his works, in English and German, are now (1873) in course of publication in Leipzig.

CLEMENT, the name of fourteen popes and of three antipopes. **I. St. Clement**, or **Clement of Rome (CLEMENS ROMANUS)**, one of the apostolic fathers, born about A. D. 30, died about 100. He is supposed to be the Clement mentioned by St. Paul in Phil. iv. 3, as one of his fellow workers, and according to tradition was baptized by St. Peter, and elected bishop of Rome in 67, or by some accounts in 91. As the most probable accounts place his death in 100, he must on this supposition have witnessed the persecution of Domitian (95-'6). His martyrdom took place in the third year of Trajan; but nothing certain is known as to the manner of his death. The Roman breviary, in harmony with a very ancient tradition, states that he was thrown into the Euxine while exiled on the Tauric Chersonesus. In the Roman calendar his feast occurs on Nov. 23. His two epistles are contained in the collections of the apostolic fathers. **II. Snidger**, of Saxon birth, died at Pesaro, Oct. 9, 1047. He was successively canon of Halberstadt, chaplain to the archbishop of Bremen, bishop of Bamberg, chancellor to King Henry III., and in 1046 succeeded Gregory VI. He crowned Henry emperor, held a council at Rome for the extirpation of simony, and is believed to have died of poison. **(III.) Guibert**, antipope, a native of Parma, died in 1100. Made archbishop of Ravenna through the influence of Henry IV., he was elected pope in an assembly held at Brescia in 1080, and while Gregory VII. was closely besieged by the imperial troops in the castle of Sant' Angelo. He excommunicated the lawful pope, who in his turn laid him under his ban, and never consented to absolve him. When Gregory was delivered by Robert Guiscard and his Normans, Clement remained master of a part of Rome, held it during the pontificate of Victor III., and was expelled under Urban II. After some brief stay at Ravenna, he was enabled by the active support of the emperor to reënter Rome, whence he was finally driven under Pascal II. He died miserably after 20 years of intrusion into the papal office. **III.**

Paolo or Paolino Scolaro, of Roman birth, died in March, 1191. He was cardinal-priest and bishop of Palestrina, when he was elected pope at Pisa, Dec. 19, 1187. He made his solemn entry into Rome March 13, 1188, after having proclaimed a crusade against the Saracens, who had just recaptured Jerusalem. **IV. Guido Fulcodi** (GUI FOULQUOIS, FOULQUES, or FOUQUET), of a knightly family of St. Gilles in Languedoc, died at Viterbo, Nov. 29, 1268. Successively a soldier, juriconsult, secretary of the king of France, bishop of Puy, archbishop of Narbonne, cardinal-bishop of Sabina, papal legate to England, and pope, he maintained throughout his whole career a uniform character of simplicity, uprightness, and unselfishness. Elected at Perugia, Feb. 5, 1265, he besought the cardinals to reconsider their vote, but was compelled to assume the duties of the pontificate. He signed the pragmatic sanction which ended the differences between the Roman and French courts, and rejected the reformation of the calendar proposed by Roger Bacon. Having ratified the cession of the kingdom of Naples to Charles of Anjou, made by his predecessor, Urban IV., he has been accused by some historians as accessory to the tragic end of Manfred and Conradin, the heirs of the Swabian dynasty. He was a decided enemy of everything that savored of nepotism; and among the letters preserved of him is one to his nephew Pierre Gros, which is a monument of the pontiff's austere disinterestedness. **V. Bertrand Garcias de Goth, or de Gauth**, born at Uzeste or Villandreau, near Bordeaux, about 1264, died at Roquemaure, in Languedoc, April 20, 1314. The fact of his having been the first pope who resided at Avignon, the part which he took in the suppression of the templars, and the political game which he played with the sovereigns of Christendom, have caused the most contradictory and doubtful accounts to be written about his birth, education, election to the papal office, and the acts of his pontificate. Ordained priest at Bordeaux, he was promoted by Boniface VIII. to the bishopric of Comminges in 1295, and to the metropolitan see of Bordeaux in 1299. The Roman see became vacant July 6, 1304, and after a stormy conclave the influence of the French king caused the archbishop of Bordeaux to be elected at Perugia, June 5, 1305. Whether on account of the distracted state of Italy and the rebellious disposition of the Roman people, or because his protector Philip the Fair prevailed on him to remain within or near his dominions, Clement V. determined to fix his abode at Avignon. His first act after his enthronization was to absolve the king from the excommunication fulminated against him by Boniface VIII., and to create ten French cardinals. On the other hand, he pronounced in 1311, in a council assembled at Vienne, the charges of heresy brought against Boniface to be without foundation. In May of the following year the order of templars, after an existence of 194

years, was suppressed by a solemn bull. The bull of suppression was enforced with great cruelty by Philip the Fair, who caused the grand master and other dignitaries of the order to be burned at the stake, and seized upon all their property situated within his dominions. Clement received at Avignon the homage of Robert of Naples, and henceforth protected this prince against the imperial power. Charles, a nephew of Robert, was at the same time acknowledged as king of Hungary. He excommunicated the Venetians for having occupied Ferrara, which his troops reoccupied before the end of the year. He favored, as far as he dared, Henry of Luxemburg in opposition to Charles of Valois, the brother of the French king; had Henry crowned emperor at Rome by a commission of cardinals, and tried in vain to compel him to make peace with the king of Naples. He published in 1313 the constitutions called Clementines, which form part of the *Corpus Juris Canonici*. **VI. Pierre Roger**, born of a noble family of Limousin, died at Villeneuve d'Avignon, Dec. 6, 1352. A Benedictine monk at first, he was made bishop of Arras and chancellor to Philip of Valois, then archbishop of Rouen and cardinal, and finally elected pope May 7, 1342. He had a controversy with Edward III. of England concerning benefices, ruled that the jubilee should be celebrated every 50 instead of every 100 years, and persisted in residing at Avignon. Petrarch and Rienzi were in vain sent to him by the Romans to urge him to return to his see. Rienzi, whom the pope made his protonotary, went back to Rome, of which he became ruler under the title of tribune. The excommunication pronounced in the preceding reign against the emperor Louis the Bavarian was renewed by Clement, who also confirmed the election of Charles IV. as king of the Romans. He purchased the city and territory of Avignon from Joanna of Naples, whose husband Andrew he had crowned. Villani accuses him of cupidity and gross immorality, while Petrarch praises his culture, eloquence, and generosity. His charity was fully exhibited toward the victims of the great plague of 1348. **(VII.) Robert de Genève**, antipope, born about 1342, died in September, 1394. He was the fifth son of Amadeus of Geneva and of Maud of Auvergne and Boulogne, allied by blood to nearly all the reigning families of Europe, and successively canon of Paris, protonotary of the holy see, bishop of Téroanne and Cambrai, and in 1371 cardinal. Gregory XI. in 1376 appointed him legate or governor of the Romagna and the march of Ancona, placing under his command an army destined to reestablish the temporal authority of the Roman see in the states of the church and the north of Italy, then in open revolt against the pope. The cardinal-legate called to his assistance the famous Jehan de Malestroit, with his band of Breton freebooters composed of 6,000 cavalry and 4,000 infantry. After reducing

the Milanese, Robert and his allies endeavored in vain to terrify the Bolognese into submission, and then ravaged the surrounding territory with fire and sword. The citizens of Cesena, indignant at these atrocities, rose up against Robert, and shut him up within the walls of Murata. In this plight he invoked the aid of Sir John Hawkwood and his "White Companions," then at Faenza. On their arrival before Murata, a full pardon was promised by the cardinal to the citizens if they would open their gates. But once outside the walls, he let loose upon his besiegers the pitiless hordes of Hawkwood and Malestroit, and 5,000 persons perished. On the death of Gregory XI., the cardinals elected an Italian, who assumed the name of Urban VI. The majority of them, being Frenchmen, resented the bitter animosity shown to their nation by the new pontiff, while his haughtiness and harshness offended his own countrymen. Under these circumstances, twelve French and four Italian cardinals met at Fondi, declared the election of Urban invalid, and chose for pope Cardinal Robert, whose sole qualification for the office, besides his Genevese extraction, was his unquestioned but unscrupulous ability. He took the name of Clement VII., and became the first of the line of the antipopes of Avignon, and the prime author of what is called the great western schism. He was at first acknowledged as rightful pope by the sovereigns of Naples, Aragon, and Castile. The rest of Italy, with all Germany, England, Brittany, Hungary, and Portugal, remained faithful to Urban. France was neutral for a time, but, as the new antipope promised to reside at Avignon, Charles V. saw too many political advantages in possessing the chief of the Christian world, and thus became his ardent supporter. This division produced the most lamentable results. Naples in particular became a field of intrigue and bloody strife. The ill-fated queen Joanna was induced to pay homage to Clement, who also persuaded her to adopt as her heir Louis of Anjou, brother to the French monarch, while France and Naples entered into an engagement to expel Urban VI. from Italy. Urban met this danger by proclaiming a crusade against his enemies. England and Flanders thereupon armed themselves in his cause, and the fairest portions of the Low Countries were ravaged by Henry Spencer and his followers. Theological discussions waxed hot in the midst of these calamities, and religious men of both parties and of every Christian nation began to fear for the very existence of the Christian name. Urban VI. died in October, 1389, and Clement thereupon appealed to the cardinals to recognize him as sole pope. But the Italian cardinals elected Pietro Tommacelli, known as Boniface IX. At length, on June 30, 1394, Nicolas de Clémengis, in a memoir presented to the king of France, urged the absolute necessity of terminating the scandal of Christendom by referring their respective claims

to arbitration. The suggestion was approved by the university of Paris, and the cardinals at Avignon were induced by public clamor to urge its adoption on Clement VII. This so affected him that he was seized with sudden illness and died soon after. **VII. Giulio de' Medici**, a natural son of Giuliano de' Medici, and cousin of Leo X., born in Florence about 1475, died Sept. 25, 1534. Carefully educated by his uncle, Lorenzo the Magnificent, he became knight of Malta, grand prior of Capua, archbishop of Florence, cardinal, chancellor of the Roman church, and pope in 1523, his election having been carried over the heads of the Colonna faction. As Charles V. seemed to threaten all Italy with the yoke, Clement formed a league against him with the Venetians and the kings of France and England. The pope, unaided by his royal allies, sought together with Venice to obtain a truce from the emperor; but he soon saw Rome sacked by the Spanish troops commanded by the constable de Bourbon (1527), and became a prisoner in the castle of Sant' Angelo. After having ceded several strongholds to his enemy, and given five cardinals as hostages, he was set at liberty, made peace with the Colonnas, and fled to Orvieto. In 1530 he became reconciled with the emperor, and crowned him at Bologna. On March 23, 1534, Clement gave his judgment on the divorce of Henry VIII., declaring the marriage with Catharine of Aragon lawful and valid, condemning the proceedings against her as unjust, and commanding Henry to take her back as his lawful wife. The bill abolishing the pope's authority within the realm of England was introduced into the commons in the beginning of March, was transmitted to the lords a week later, was passed by them on March 20, and received the royal assent on March 30. "It was not possible," says Lingard, "that a transaction in Rome on the 23d could induce the king to give his assent on the 30th." Thus the judgment of Clement was not the cause of the separation of England from the Roman communion. But in May following was issued the bull which is thought to have rendered the separation irremediable. In 1533 Clement had gone to Marseilles to meet Francis I., and there affianced his niece Catharine de' Medici to the heir to the French throne. He returned to Rome a prey to a slow fever brought on chiefly by anguish of spirit, which soon proved fatal. He had succeeded in making peace with the sovereigns of Ferrara and Florence, had sent missionaries to preach the gospel in Mexico, and had vainly endeavored to correct the ecclesiastical abuses and disorders of Italy. **(VIII.) Gil Muñoz**, antipope, was canon of Barcelona when he was elected pope by the dissenting cardinals after the death of Benedict XIII. (1424). He was installed at Peñíscola, but the reconciliation of the king of Aragon, Alfonso V., with Pope Martin V., put an end to his power, and by abdicating in 1429 he terminated the schism which had divided the church

for 51 years. He received the bishopric of Majorca in compensation for his empty pontificate.

VIII. Ippolito Aldobrandini, of a noble Florentine family, born at Fano in 1536, died March 3, 1605. Distinguished for his virtues, he became auditor of the rota, referendary of Sixtus V., and cardinal, and succeeded Innocent IX. in the papal chair, Jan. 30, 1592. The principal political movement of his reign was the favor which he showed to the league against Henry IV. of France, and the absolution which he gave to that monarch when he made public profession of Catholicism. He strove to make learning and piety flourish in the church, condemned duels, crowned the poet Tasso, and raised to the cardinalate Baronius, Bellarmine, Du Perron, and other famed men. In his reign began the controversy concerning grace, on occasion of the publication of the works of Molina, which occupied the most distinguished theologians of the 17th century.

IX. Giulio Rospigliosi, born at Pistoja in 1600, died Dec. 9, 1669. He was auditor of legation in France, nuncio in Spain, and cardinal, and succeeded Alexander VII. June 20, 1667. He coöperated with Louis XIV. in lulling the controversy between the Jansenists and Jesuits, by obtaining subscriptions to the formula which was styled the "peace of the church." He repaired the finances of the pontifical treasury, and vainly sought to unite the Christian princes in aid of the Venetians against the Turks, who were besieging Candia.

X. Emilio Altieri, born in Rome, July 13, 1590, elected pope, April 29, 1670, after a conclave of more than four months, died July 22, 1676. In his pontificate began the controversy with France concerning the revenues of vacant sees. He wholly abandoned the administration of the government to Cardinal Paluzzi, his nephew by adoption.

XI. Giovanni Francesco Albani, born at Pesaro, July 22, 1649, succeeded Innocent XII. Nov. 23, 1700, died March 19, 1721. He supported Louis XIV. in the war of the Spanish succession, recognized the archduke Charles only by constraint of the imperial troops which invaded the Papal States in 1709, and the ancient fiefs of the church, Sicily, Sardinia, Parma, and Piacenza, were given to new princes. He had a controversy with Victor Amadeus II., king of Sicily, concerning ecclesiastical jurisdiction in that kingdom, and received with royal honors the son of James II., the pretender to the throne of England. He confirmed the condemnation of the five famous propositions of Jansenius by the bull *Vineam Domini* (1705); and by the bull *Unigenitus* (1713) he condemned 101 propositions extracted from the "Moral Reflections" of Quesnel. He promoted literature and the arts, and enriched the Vatican library with valuable oriental manuscripts.

XII. Lorenzo Corsini, born at Florence in 1652, died Feb. 6, 1740. He was created cardinal in 1706 and bishop of Frascati in 1725, and was elected pope July 12, 1730, as successor of Benedict XIII. One

of his first acts was to punish Cardinal Coscia for maladministration under the last pontificate. His reign was troubled by the disagreement between the courts of Vienna and Madrid, which excited fierce wars in Italy, and he indemnified the cities of Ferrara, Bologna, and Ravenna, which had been pillaged by the imperial troops. In 1738 he invested Don Carlos with the kingdom of Naples and Sicily, adjudged to him by the treaty of Vienna. In 1740 he restored the liberties of the republic of San Marino. He at first applauded the doctrines of St. Thomas, and gave to the schools of the Dominicans the privileges of universities, but afterward showed equal favor to the anti-Thomists. He founded in 1734 the Corsini seminary, designed for the education and conversion of young Greeks; and his efforts for the promotion of the arts and sciences in Rome were more successful than his political enterprises.

XIII. Carlo Rezzonico, born in Venice in March, 1693, became cardinal in 1737 and bishop of Padua in 1743, succeeded Benedict XIV. July 6, 1758, and died Feb. 3, 1769. He actively administered the Papal States, and was in controversy with several of the governments of Europe throughout his reign. The first question related to the Jesuits, who had been already expelled from Portugal and France, but whom he eulogized and confirmed in their former privileges by the bull *Apostolicam* (1765). This, however, did not prevent them from being exiled soon after from Spain, the Two Sicilies, Parma, and Malta. He attempted in vain to maintain ecclesiastical jurisdiction in the duchy of Parma; and when he excommunicated Duke Ferdinand in 1768, the Bourbons acted in combination against him according to the terms of the family pact, and France seized Avignon, Naples captured Benevento, and Spain added violence to the persecution of the Jesuits. A splendid mausoleum, one of the best works of Canova, is erected to his honor in the church of St. Peter.

XIV. Giovanni Vincenzo Antonio Ganganelli, born at Sant' Arcangelo, Oct. 31, 1705, died Sept. 22, 1774. He received a learned education in the schools of the Jesuits and the convents of the Franciscans, gained distinction as a teacher of philosophy, and became successively director of the college of St. Bonaventura at Rome, cardinal, and councillor of Benedict XIV. He was elected pope as successor of the preceding, May 19, 1769, after the conclave had sat nearly three months, during which all the sovereigns of the house of Bourbon had pledged themselves either to obtain from the new pope the suppression of the Jesuits, or to throw off their allegiance to the Roman see. His predecessor, in seeking to save the Jesuits, had involved himself in a contest with almost all Europe, and in striving to maintain ecclesiastical immunities had alienated a part of his states and had diminished the respect of civil governments for the holy see. Clement XIV. suppressed the reading of the bull *In Cena Domini*,

which had irritated the Bourbon courts, but prudently and firmly resisted them when they demanded the immediate abolition of the society of Jesus. After four years of investigation into the charges brought against the society, and when Austria united with the other Catholic powers in assailing it, he at length, July 21, 1773, granted the famous brief of suppression, *Dominus ac Redemptor*. By this measure he prevented a rupture with the princes of Europe, and recovered Avignon, Benevento, and other places which had been seized by France and Naples. A man of unquestioned piety, learning, and ability, his pontificate occurred in evil days. The violence brought to bear on him by the Catholic courts in order to obtain the suppression of the Jesuits filled his soul with bitterness. Incontrovertible testimony establishes the fact that he died broken-hearted. The letters published as his by Caraccioli, his biographer, are considered unauthentic. The Clementine museum is a monument of his munificence and love for the fine arts. Theiner published a history of his pontificate (3 vols., Leipsic, 1853), which was passionately assailed by Crétineau-Joly; and the memory of the pontiff has been vindicated by the Jesuit De Ravignan (*Clément XIII. et Clément XIV.*, Paris, 1854).

CLÉMENT, Jacob, a Flemish composer of the 16th century, principal chapelmaster of the emperor Charles V. He stood at the head of his profession in the period between Desprès and Palestrina, excelled both in sacred and secular music, and was called *Clemens non papa*. Seven of his posthumous books of motets, in four parts, were published in London in 1567, and his *Missa Defunctorum* in 1580.

CLÉMENT, Jacques, a French regicide, born in Champagne about 1565, killed at St. Cloud, Aug. 1, 1589. He was a monk, and was selected at the suggestion of Bourgoing, prior of the convent of the Jacobines at Paris, as the instrument of the duke de Mayenne and the other leaders of the league for the assassination of Henry III. After having spent July 31, 1589, in fasting, and partaken of the eucharist, Clément went the next morning to St. Cloud, where, as the bearer of a letter from Achille de Harlay, he was admitted to the palace. While Henry III. was reading the letter Clément stabbed him. The king, throwing the knife which had inflicted a mortal wound into the murderer's face, exclaimed, "Oh, the wicked monk! he has killed me. Put him to death." The attendants killed him on the spot, and his remains were dragged in the mire, quartered, and burnt. The king died next morning, and Clément was proclaimed a martyr by Bourgoing, and by Pères Commelet, Guignard, and Mariana. The last named published *De Rege et Regis Institutione* (1599), in glorification of the regicide.

CLÉMENT, Jean Pierre, a French historian and political economist, born at Draguignan, June 2, 1809. He early acquired prominence as a

free-trader and as a writer on political economy and history; and in 1855 he was elected to the academy of moral and political sciences. His works include *Histoire de la vie et de l'administration de Colbert, précédée d'une notice historique sur Nicolas Fouquet* (1846); *Le gouvernement de Louis XIV.* (1848); *Jacques Cœur et Charles VII., ou la France au XV^e siècle* (2 vols., 1853); *Histoire du système protecteur en France depuis le ministère de Colbert jusqu'à la révolution de 1848* (1854); editions of *Réflexions sur la miséricorde* and of *Lettres de la duchesse de La Vallière* (2 vols., 1860); and *Lettres, instructions et mémoires de Colbert* (8 vols., 1863-72), published under the auspices of the government, and in 1872 crowned with a valuable prize by the academy.

CLEMENT, Knut Jungbohn, a Danish historian, born on the island of Amrum, N. Friesland, Dec. 4, 1803, died at Bergen, N. J., Oct. 9, 1873. After travelling in Great Britain, France, Germany, &c., at the expense of the Danish government, he became professor of history at the university of Kiel. In 1873 he visited the United States. He published several works relating to philology, and to his travels in Ireland, Friesland, Holland, and Germany. Among the principal are, in German, *Erklärende Einleitung zur Geschichte Dänemarks* (Hamburg, 1839); *Die nordgermanische Welt* (Copenhagen, 1840); *Die Lebens- und Leidensgeschichte der Friesen* (Kiel, 1845); *Die geeignetsten Mittel zur Besserung der Schleswiger und Holsteiner* (Altona, 1848); and *Das wahre Verhältniss der süd-jütischen Nationalität und Sprache* (Hamburg, 1849). In 1873 he completed, in English, his "History of Ireland" (3 vols.), from original documents and personal investigations.

CLEMENT OF ALEXANDRIA (TITUS FLAVIUS CLEMENS, surnamed ALEXANDRINUS), one of the fathers of the church, born probably at Athens about the middle of the 2d century, died in Alexandria about 215. Early devoted to the study of philosophy, he travelled through Greece and visited Italy and Egypt. He was a proficient in the Stoic and Platonic philosophies, and had also listened to Christian teachers, when through the influence of Pantenus, master of the Christian school at Alexandria, he embraced Christianity, and became the assistant, according to others the successor, of his master in the school. The persecution under Severus in 202 obliged both to seek refuge in Palestine. He visited Jerusalem and Antioch, and according to some returned to Alexandria, but appears to have been in Jerusalem in 210 or 211, for Eusebius mentions him at that date as the bearer of a letter from the bishop of Jerusalem to the church at Antioch. Little is known of the later years of his life. He had many illustrious pupils, among whom was Origen. He is distinguished among the fathers of the church by his large acquaintance with and sincere admiration of the ancient Greek philosophy. Unlike Tertullian

and Athenagoras, he esteemed philosophy a divine work, and philosophers the prophets of paganism, whose lessons were to prepare the way for Christ among the gentiles, as the Mosaic dispensation had prepared it among the Hebrews. Adopting no one of the philosophical schools, and forming no connected scheme of Christian theology, his efforts to reconcile philosophy and religion tended to allegorical interpretations of the Scriptures, and to speculations in which the metaphysician is more apparent than the Christian. Yet by his comparison of Christian with Hellenic ideas he exerted an important influence upon his age and upon the development of Christian philosophy. His three principal extant works are a hortatory address to the Greeks (*Λόγος προτρεπτικός πρὸς Ἕλληνας*), on the vanity of heathenism and the superiority of the gospel; a treatise (*Παδαγωγός*) on the moral law of Christianity, rather with reference to the details of life than to general principles; and a discursive collection (*Στρωματεῖς* or *Στρώματα*), containing religious thoughts, philosophical maxims, and various information on topics of antiquity. The best complete edition of his works is by Bishop Potter, in Greek and Latin (2 vols., Oxford, 1715). The principal works concerning his life and doctrine are a special treatise of Neander (Heidelberg, 1811); Guericke, *De Schola quæ Alexandria floruit* (Halle, 1824-'5); Eylert, *Clemens von Alexandrien als Philosoph und Dichter* (Leipsic, 1832); Kaye, "Account of the Writings and Opinions of Clement of Alexandria" (London, 1835); Böhringer, *Die Kirche Christi und ihre Zeugen* (2d ed., Zürich, 1861); and Freppel, *Clément d'Alexandrie* (Paris, 1866).

CLEMENT OF ROME. See CLEMENT I., pope.

CLEMENTI, Muzio, an Italian pianist and composer, born in Rome in 1752, died at Evesham England, March 10, 1832. His father was a silversmith, and the son evinced at a very early age a passion for music, which the father fostered, providing him with the best instructors. His first master was Buroni, afterward first composer of St. Peter's. At seven he was placed under Cordicelli for instruction in thorough bass, and at nine he was so far advanced as to be able to pass successfully the rigid examination necessary for admission to the rank of organist at Rome. His next teachers were Santarelli, a distinguished master of singing at Rome, and Carpinì, an equally famous contrapuntist. While under the instructions of the latter Clementi composed a mass for four voices. When Clementi was 14 years old Mr. Peter Beckford, a nephew of Alderman Beckford, being upon a visit to Rome, was so much struck with his talent, especially as a player upon the harpsichord, that he invited him to England. This invitation was accepted, and from this time his interests were mainly in England, where he eventually became a partner in a leading musical house. His first residence in that country

was at Mr. Beckford's seat in Dorsetshire, where he was received as one of the family. Here he zealously pursued his studies, becoming at the age of 18 the foremost harpsichord player of his day, and composing his second *opus*, which laid the foundation for the modern sonata form and became a model for future works of that description. This at the time was also estimated as a work of extraordinary difficulty, not to be attempted by any but the best musicians; but such advances have been made in technical skill that it is now within the reach of players of moderate ability. For some years after this Clementi played the harpsichord at the opera. His reputation increased with rapidity and extended to the continent. In 1780 he visited Paris, where he was received with enthusiasm. The following year he went to Strasburg, Munich, and Vienna. At the latter city the emperor Joseph II. invited him to his palace, and he played before the court alternately with Mozart. In 1783 John B. Cramer became his pupil, and about the same time Opus 12, a set of sonatas, was published, upon one of which both Samuel Wesley and Dr. Crotch delivered public lectures in London. In 1784 Clementi returned to England, where he remained till 1802, spending much of his time in teaching. Among his most eminent pupils were Cramer, John Field, Zeuner, Kalkbrenner, Berger, and Klengel. He gave up teaching in 1800, and devoted himself to perfecting the mechanism of the piano. Connecting himself in business with Mr. Colard, in time he amassed a fortune; but he was not idle in his art, composing symphonies and other works for orchestra, and also for piano; prominent among the latter being his *Gradius ad Parnassum*. He was highly esteemed in England, and passed the latter years of his life in retirement. He retained his technical skill to the close of his life, playing and improvising at the age of 80, to Cramer, Moscheles, and others, on one occasion with so much vigor and execution as to astonish his hearers.

CLEMENTINES, the name first given to a collection of pontifical constitutions and decrees published in 1313 by Clement V. They are found embodied in the *Corpus Juris Canonici*, where they form 5 books and 52 titles. In 1317 John XXII. published this body of laws in due form, and sent copies of it to the universities of Paris and Bologna. They were issued in a separate folio volume in Mentz, 1460.

CLEOBIS AND BITON. See BITON AND CLEOBIS.

CLEOBULUS, one of the seven sages of Greece, a native of Lindus in Rhodes, and the son of Evagoras, lived in the 6th century B. C. He studied philosophy in Egypt, and was remarkable for personal strength and beauty, and for his enlightened views on female education and on other subjects. He composed songs, riddles, and sayings; among others, an ingenious riddle on the year is attributed to him by Diogenes Laërtius, while others regard it as com-

posed by his daughter Cleobulina, who also wrote enigmas in hexameters, and was renowned for her accomplishments and virtues. Several of his sayings are preserved, as: "Do good to a friend to make him a better friend, and to an enemy to make him a friend;" "Learn to bear nobly the changes of fortune."

CLEOMBROTUS I., a king of Sparta of the Agid line, son of Pausanias, succeeded his brother Agesipolis I., 380 B. C. In 378 he was sent into Boeotia at the head of an army, but as he returned without effecting anything, he was not again intrusted with command till 376, when the illness of his colleague Agesilaus compelled the ephors to appoint him once more general-in-chief, but he again returned without result. In 374 he was sent into Phocis with an army to aid the Phocians in repelling the Thebans from their territory, which he effected without any contest. He remained in Phocis till 371, when he received orders to enter Boeotia and commence offensive operations against the Thebans. Having captured Creusis and 12 triremes in its harbor, he advanced to Leuctra, where he rashly gave battle to Epaminondas on ill-chosen ground and was totally defeated. He displayed heroic bravery, and was fatally wounded.

CLEOMEDES, a Greek astronomer, who flourished probably in the 1st century, was the author of a treatise on the "Circular Theory of the Heavenly Bodies," which is still extant. It consists of two books, the first of which treats of the universe in general, of the zones, of the motions of the stars and planets, of day and night, and of the magnitude and figure of the earth. The most interesting dissertations in the second book are on the magnitude of the sun and moon, and on the illumination, phases, and eclipses of the moon. The latest and best editions of this work are by Backe (Leyden, 1820), with a Latin translation and comments by Balfour; and by C. C. T. Schmidt (Leipsic, 1832).

CLEOMENES, the name of three kings of Sparta, of the Agid line. **I.** Son of Anaxandrides, reigned from about 520 till 491 B. C. Before his accession he was regarded as almost insane; and subsequently he displayed great rashness and cruelty, especially in the burning of Argive captives after the great battle in which 6,000 of his enemies fell. He commanded the Spartans who were sent, in obedience to the repeated oracles of Delphi, to deliver Athens from the tyranny of Hippias (510). He then assisted the party of Isagoras against the Alcæonidæ headed by Clisthenes; but Isagoras, after having banished 700 families from Athens, still more betrayed his ambitious schemes by attempted changes in the senate, and roused the people against himself; the exiles were recalled, and Cleomenes was besieged in the acropolis, and compelled to capitulate. Many years after, accused by his colleague Demaratus of a leaning toward Persia, he bribed the oracle of Del-

phi, and caused the deposition of Demaratus. He was soon banished himself, and went to Thessaly, then to Arcadia, where he incited the people against the Spartans, who, dreading his revenge, permitted him to resume the throne; but on his return the insanity which he had manifested from his earliest life became so violent that he was confined in the stocks, where he committed suicide. **II.** Son of Cleombrotus I. and successor of his brother Agesipolis II., reigned 370-309 B. C. Nothing historically important is recorded of his life. **III.** Son of Leonidas II., reigned 236-220 B. C. He married at an early age the widow of Agis IV., commenced war with the Achæan league, caused the banishment or death of distinguished citizens opposed to his schemes of regeneration, poisoned his infant colleague, and reigned with his own brother Euclidas. He proclaimed the abolition of all debts, relinquished his own property, made a new distribution of the lands, and restored the ancient system of education, the public tables, and other institutions of Lycurgus. The Achæans, attacked and beaten by Cleomenes, invoked the aid of Macedon; and Antigonus Doseon entered the Peloponnesus with a large army, and routed the Spartans in the bloody battle of Sellasia. Cleomenes fled to his ally, Ptolemy Evergetes of Egypt, who received him kindly, but soon died, and his son Philopator threw the Spartan king into prison on a charge of conspiracy against his life. He escaped, and killed himself, after a vain attempt to raise an insurrection.

CLEON, an Athenian politician, died in 422 B. C. He was the son of Cleænetus, and a tanner by trade. Endowed with eloquence, he turned his attention to politics, and soon became one of the popular leaders. After the death of Pericles, and for a period of six years, Cleon was the most influential man in Athens. In 427 he persuaded the Athenians to doom the adult males of Mytilene, their revolted ally, to death, and the women and children to slavery; but the vote was rescinded before the edict could be executed. In the "Babylonians" of Aristophanes, represented the next year, Cleon supposed himself assailed, and he retorted by commencing a suit either against the poet or the performer of the caricature; but Cleon himself was brought to trial, and forced to give up a sum of money which he had unfairly obtained from some of the subjects of Athens. These attacks, however, did not shake his power, and he successfully opposed the attempt to grant peace to Sparta, which state was anxiously desirous of bringing the Peloponnesian war to a close when a number of her citizens were shut up in the island of Sphacteria. By the jeers of Nicias and the rest of the peace party, he was induced to take command of the forces at Sphacteria, promising to capture or slay the Spartans within 20 days. His enemies consoled themselves with the belief that he would

fail, and that failure would ruin him. But complete success crowned his labors, and the Spartans were forced to surrender. Although the merit of the military exploit is principally due to Demosthenes, the Athenian general, it is undeniable that Cleon's arrival on the scene of operations infused new spirit into the assailants, whose numbers were overwhelming. His political character was nevertheless bitterly assailed by Aristophanes in his comedies, "The Knights" and "The Wasps." The close of Cleon's career was marked by his mismanagement of an expedition into Macedonia, to operate against the Spartan Brasidas. The Athenians were totally defeated at Amphipolis, Cleon being slain and Brasidas mortally wounded. Cleon is represented by Thucydides and Aristophanes as a mere demagogue; but Grote and others have zealously endeavored to effect a reversal of the unfavorable judgment pronounced against him by his enemies, and by the writers of the aristocratic faction, of which he was the leading opponent.

CLEOPATRA, the last queen of Egypt, third and eldest surviving daughter of King Ptolemy Auletes, born in Alexandria in 69, died there, August 30, 30 B. C. In 51 her father died, and left her by his will the joint heir of the throne with her brother Ptolemy, who was also, according to a not uncommon practice of the Egyptian royal families, to become nominally her husband. Cleopatra was at this time only 17 years of age; but her remarkable precocity, her great talents, and the unbridled ambition of which she already gave unmistakable indications, soon showed the intriguing courtiers who surrounded her and the still younger Ptolemy that so long as she shared the throne they could not hope for that uncontrolled power which they had expected to enjoy on account of the youth and inexperience of the two rulers. Desirous therefore of ridding themselves of the young queen, they succeeded without difficulty in turning her brother against her; and taking advantage of one of the popular riots then frequent in Alexandria, they excited the people by accusing her of scheming for undivided power, and expelled her from the city in the year 49. Pothinus, Ptolemy's guardian, and Achilles, the commander of the army, were the leaders in this movement. Cleopatra at once began preparations for regaining her rights. Rome, where she might have sought aid, as the senate had confirmed her father's will, was in too disturbed a state to answer any appeal, and she attempted none; but collecting her adherents and such forces as she could procure on the Arabian boundary of Egypt, she began to advance upon the country, and prepared for an engagement with the army of Achilles sent against her. In the mean time important events were happening elsewhere. The war between Cæsar and Pompey had been ended by the overwhelming defeat of the latter at Pharsalia (Aug. 9, 48); and the conquered general fled to Egypt, where he

hoped to find a friendly reception, more especially as his party had proclaimed themselves in favor of Ptolemy in his strife against his sister. The treacherous assassination of the Roman leader near Pelusium showed how fatally mistaken was his plan of flight; but the Egyptians failed to gain by his murder the expected end, that of keeping the conqueror away from their country. Pompey had been dead but a few days when the ships of Cæsar appeared in the harbor of Alexandria, early in the month of October. In want of money, and perhaps disposed to interfere in Egyptian affairs, he landed in the city and took up his residence there for the winter months, in spite of the opposition of the people. Several writers even represent him as having been before this attracted by the report of Cleopatra's beauty, which was certainly already famous, and as having prior to his coming received secret agents bringing appeals from her, so that he was even now prejudiced in her favor and ready to embrace her cause; but this is by no means certain. His first act was an impartial one. When he had established himself in the royal palace, suppressing the violent resistance of the Alexandrians, and had the young king entirely in his power, he commanded both the combatants for the throne to lay down their arms and submit the question of their rights to him. Achilles, encamped with his army at Pelusium, refused to obey the order, in spite of the fact that the young Ptolemy was held a virtual prisoner in the city. But Cleopatra at once obeyed, and disbanded her army. She now determined to seek Cæsar in person, and resolved upon the daring venture which forms a celebrated episode in her career. With a single trusted attendant, a Sicilian named Apollodorus, she made her way at twilight, in a little boat, from a larger vessel out at sea, into the harbor of Alexandria, and succeeded in reaching unobserved the steps leading from the royal palace to the water. Wrapped in a roll of heavy carpet tied with cords, she was now carried by Apollodorus into Cæsar's presence. The carpet was unrolled, and the queen, whose beauty at this period of her life must, according to the old historians, have been most brilliant and perfect, appeared for the first time before the astonished Roman. By the added influence of her personal fascination and this daring *coup de théâtre*, Cleopatra's end was gained at once, and from this moment until Cæsar's death her power over him does not appear to have decreased. He now interfered actively, in her interest, in Egyptian affairs, and at first brought about a kind of reconciliation between her and her brother; but this was not lasting, and a complication of intrigues ensued, by which first one and then another of Cleopatra's family endeavored to gain possession of the throne and to drive Cæsar and the queen from the country. A war followed in which Cæsar, cut off in a foreign port, and with only the

troops he had brought with him, was very hard pressed; but he conquered. Ptolemy, who had escaped from the palace to join the Egyptian army, fell in a battle on the Nile near Memphis; and Cleopatra was again made queen, her only surviving brother, a child of six years, being nominally associated with her. The country was now quiet, and the remaining months of Cæsar's life in Egypt were given up to revelry and luxury, which Cleopatra prepared for him with all the resources of her riches and ingenuity; but he was soon compelled to abandon this course of brilliant festivals and the idleness of Alexandria for the East, where Pharnaces, the king of Bosphorus, was in dangerous revolt. He left Egypt in 47, and a few months after his departure Cleopatra bore him a son. Even before his going he had agreed that Cleopatra should go to Rome on his return, and he had no sooner reached that city after conquering Pharnaces than he prepared to carry out the plan. In 46, with her little son Cæsarion, she set sail from Alexandria, and made her entry into Rome with great splendor; ostensibly coming to ask alliance from the senate, but recognized by every one as the acknowledged mistress of Cæsar, who installed her in a palace near the Tiber. Here she held her court like a rightful queen of Rome, flattered by the chief men of the time for the sake of the dictator's favor, but hated by them and by the people, who saw in Cæsar's open relations with a foreign woman a disgrace which Romans felt with special keenness. For a time she seemed to have reached the summit of her ambition, for the dictator treated her with every favor and seemed about to make her his companion in power; when suddenly his assassination (44) destroyed all her hopes and plans at a blow. A short time after the murder she returned to her own capital. During the civil war which followed she preserved a neutral attitude, having much to dread, whichever side conquered. One of her generals, Serapion, assisted Cassius, contrary to her wish, and was afterward punished for his action. Another of her leaders was also induced to join Cassius; but in the main her neutrality was well preserved until the battle of Philippi (42), the event which placed the triumvirate in power, and made Mark Antony the ruler over the East. Cleopatra now saw the necessity for action, and, relying upon the same power of personal fascination that had won Cæsar, she prepared to meet the conqueror. After spending a little time in Athens, Antony had begun a journey into Asia, and had finally established a brilliant court at Tarsus, where the various eastern potentates were already thronging to do him homage. Cleopatra alone did not appear; such a delay as should stimulate Antony's impatience to see her was a part of her plan. For the successful triumvir was not now to meet her, as Cæsar had done under similar circumstances, for the first time. Antony had

seen and admired her in Rome, and she appears to have known that among all the rulers of his eastern dominions, the famous queen was the one for whose coming he was most anxious. Instead of summoning her peremptorily, he sent an ambassador to tell her that she had nothing to fear from him, and to beg that she would visit him at Tarsus; and he followed this message by several letters of the same purport before Cleopatra believed that she had sufficiently aroused his impatience, and at last obeyed (41 B. C.). As he sat enthroned in the market place of the town, it was announced that the Egyptian queen was approaching up the Cydnus, in that splendid progress pictured in sufficiently glowing prose by Plutarch, but made famous for all time by the description of Shakespeare. When Antony sent messengers to ask that she would come to him, she replied that she had hoped to see him first her guest; and the triumvir visited her as soon as she had landed. The beautiful queen's conquest was immediate and complete; with this meeting began that unbridled life of the two lovers that has formed ever since a favorite theme with historians, romancers, and poets; and "from this moment," says Appian, "the before untiring energy of Antony began to grow dull; only that happened which Cleopatra desired, without long inquiry as to what was right and sacred." When Cleopatra returned to Egypt, it was with the promise of another meeting; and Antony, as soon as he could make the most necessary disposition of his troops and his affairs, followed her to Alexandria. The winter of 41-40 passed in revelry of every kind, and only the complications which arose in Rome, and which soon grew too formidable to be neglected, called him from her in the spring. While at the seat of the war against the Parthians, in Asia, he received the news that his party, headed by his wife Fulvia, to whose ambition and desire to distract his thoughts from Cleopatra the outbreak of the conflict in Italy was chiefly due, had been defeated at Perusia. He hastened to Athens on his way westward, and there meeting Fulvia, who had fled thither, he arranged his plans, and sailed for Italy. But the decisive contest was this time averted. Fulvia, left behind in Sicily, and neglected and thrust aside by her husband, died, overwhelmed in grief and anger. A reconciliation between Octavius and Antony was arranged at Brundisium, and the sister of the former, Octavia, became Antony's wife. Cleopatra had now to endure three years of separation from the man whom she thought she had successfully attached to her for life; and we have descriptions from several writers of her rage and jealousy on hearing of his new marriage. But her hold upon him was stronger than she knew. For two winters Antony lived in comparative quiet with Octavia in Athens; the summers were full of activity among the constant complications, quarrels, and reconcilia-

tions of the triumvirate's politics; but in the year 37 the necessity of preparing for another campaign against the Parthians called him again into the East. No sooner was he separated from Octavia than the old love for Cleopatra returned in its full force. Immediately after he had landed on the Syrian coast, he sent a trusted messenger to her, and she hastened to meet him at Laodicea. The old life began again, and, as though to atone for his neglect, he heaped favors upon her, adding province after province to her kingdom, in spite of the complaints of the Romans. Completely reconciled, she returned to Alexandria, while Antony pressed on into Asia, upon his disastrous Parthian expedition. On his return Cleopatra met him on the coast with aid and provisions for his army; and now again he accompanied her to Egypt, and remained there through the next winter, planning a new campaign for the spring. This was more successful, and through it he conquered Armenia. But the decisive struggle with Octavius was not to be longer delayed, and Antony now seemed determined to hurry it on. Returning to Alexandria (34), he celebrated an arrogant triumph, at which Cleopatra was declared a supreme ruler, or "queen of kings;" her son by Cæsar was proclaimed legitimate, a direct attack on Octavius's pretensions to power; and Antony's own sons by Cleopatra were made the possessors of rich Roman provinces. Shortly after this he divorced Octavia, though he did not formally publish the fact till later. He seemed deliberately to attempt to insult the Roman people; yet they looked upon Cleopatra as the author of all that he did, and concentrated their anger upon her. The conflict between Antony and Octavius broke out early in 32, but it only became general when the Roman senate, a little later, declared war, not against Antony, who had passed the previous year with Cleopatra in the old revelries at Ephesus, Samos, and Athens, but against the Egyptian queen herself, who remained by him, aiding his preparations, and urging him to hasten the decisive conflict. The winter of 32-31 passed without event, but in the spring Octavius began with energy those movements which led to the massing of his troops at Actium, and to the decisive battle of the war. Cleopatra seems to have induced Antony, against his better judgment and that of his generals, to take the fatal step of forcing, by an imprudent movement, the engagement at Actium (Sept. 2, 31); but whether she was guilty of positive treachery when, in the midst of the battle, she gave the signal for retreat and set sail for the Egyptian coast, or whether she acted from momentary cowardice, is disputed. Escaping through an opening in the enemy's line of galleys, she made her way to sea, and Antony, abandoning the battle and deserting his troops, sailed after her with all speed to Egypt. All chance of successful resistance to Octavius was now lost; the winter passed away in preparations for de-

fence, in the old life of excesses, and in attempts made by Antony to preserve the allegiance of his troops and generals, many of whom went over to the enemy. Cleopatra seems to have retained her energy, while Antony gave himself up to despair. Many stories of this time are told by ancient authors, in which it is difficult to separate the truth and fiction—of a society, "the companions in death," in which the two revellers gathered their old associates; of Cleopatra's experiments to find the easiest way to die; of Antony's moody withdrawal from all companionship for a time, until he suddenly plunged into greater excesses than ever. In the spring Octavius appeared before the city. The last struggles Antony was able to make were soon over, and both he and Cleopatra seemed about to fall into the hands of the conqueror. As Antony and his troops fled into the city from their last attempt at resistance, the queen gave up all for lost; and hastening to an immense mausoleum she had had constructed some time before, she locked herself in it, accompanied only by two of her women, Iras and Charmian. Antony, returning to the palace, received either at her wish or by accident the report that she had ended her life. Determined not to be separated from her, he attempted to kill himself, but only inflicted a mortal wound. As he lay dying, he heard that Cleopatra lived; he had himself carried to the mausoleum, and there, when the queen and her two women had with great difficulty raised him to the only way of entrance left unclosed, he expired in Cleopatra's arms. Octavius now entered Alexandria. In spite of her precautions, the queen was captured in her mausoleum, and brought before him. He assured her that no harm should befall her; but beyond this she could obtain no intimation in regard to her future fate. The fascination that had conquered Cæsar and Antony had no effect upon him, and after trying all her power of charming, Cleopatra at last saw that she was only allowed to live to grace the conqueror's triumph. She was carefully watched, lest she should put an end to her own life; but she successfully eluded the vigilance of her guards by a skilful device. A countryman bringing her figs brought with them an asp in his basket, and thus furnished her the means of death. Causing Iras and Charmian to array her in her most splendid royal robes and in her crown, she placed the asp in her breast and died from the poison of its bite. Her women imitated her, and the soldiers of Octavius found them lying by her, dead.

CLEPSYDRA (Gr. κλεψύδρα, from κλέπτειν, to steal, and ὕδωρ, water), a hydraulic clock in use among the ancients, which measured time by the quantity of water that escaped from a small orifice in a reservoir. The simplest kind consisted of a transparent vase, filled with water, graduated, and having a small opening in its bottom. As the liquid gradually escaped,

its height in the vase marked the hour. Clepsydras were in use in Egypt under the Ptolemies, and a great improvement in them was made by Ctesibius, a mathematician of Alexandria, about 235 B. C. In his instrument the water was made to drop upon wheels which were thereby turned, and the motion was communicated to a small statue, which gradually rose and pointed with a rod toward the hours marked on a diagram. Clepsydras measured the time allowed for speakers in courts of justice, and they are frequently referred to in the writings of Aristophanes, Aristotle, Plato, Demosthenes, Cicero, and Pliny, like the sands of the hour glass in modern literature. Soon after the decline of Rome they were spread throughout Europe, but their use was abandoned after the invention of pendulum clocks. At the beginning of the 9th century Charlemagne received a magnificent clepsydra as a present from the caliph Haroun al-Rashid. The fact that the quantity of water escaping from the orifice varies according to the height of the column and the shape of the vase furnishes a difficult mathematical problem, which occupied the most skillful geometers of the 18th century. For its solution Bernoulli received a prize from the French academy of sciences.

CLERC, Laurent, a deaf mute, one of the founders and teachers of the asylum for the deaf and dumb at Hartford, Conn., born at La Balme, department of Isère, France, Dec. 26, 1785, died in Hartford, July 18, 1869. In his infancy he fell into the fire, when his head and face were badly burned, and his parents attributed the loss of hearing and smell to this misfortune. At the age of 12 his uncle took him to Paris, and placed him in the institution for the deaf and dumb. The abbé Sicard, though nominally its director, was then in prison for his alleged hostility to the republic; but Jean Massieu, himself a deaf mute, became his teacher till the release of Sicard, when he became a favorite pupil of the abbé, and made such rapid progress that in 1805, after eight years' instruction, he was appointed tutor, and in 1806 a salaried teacher. His aptitude for teaching was such that in a few years the abbé confided to his charge the highest class in the institution, which he taught with great success. In 1815, while on a visit to England, he formed the acquaintance of the Rev. Dr. Gallaudet, whom he accompanied in 1816 to the United States. In 1817 they opened the American asylum for the deaf and dumb at Hartford, and Clerc contributed much to the success of this institution, from which he retired on a pension in 1858, after having been a teacher of deaf mutes for more than 50 years. The greater part of the teachers sent to other institutions for the deaf and dumb from this asylum received their training at his hands. He married in 1819 Miss Boardman, a pupil of the asylum, and like himself a deaf mute. Their children all speak and hear. The eldest son became an Episcopal clergyman.

CLERC, Jean Le. See **LE CLERC**.

CLERFAYT, or **Clairfait**, **François Sébastien Charles Joseph de Croix**, count de, an Austrian general, born at Bruille, in the Low Countries, Oct. 14, 1733, died in Vienna, July 18, 1798. He entered the Austrian army at the age of 20, distinguished himself in the seven years' war and in that of the Bavarian succession, and in 1773 became a major general. He was afterward made chamberlain, but rarely showed himself at court, being opposed to the innovations of Joseph II. and to the measures which led to the troubles in the Netherlands in 1787. In 1788-'9, as lieutenant field marshal, he commanded an army corps on the lower Danube, successfully operating against the Turks, who threatened the banat of Temesvár and Transylvania, and subsequently aiding Marshal Laudon in the taking of Belgrade. In 1792 he commanded the Austrian contingent in the war with France, made himself master of Stenai, and compelled the retreat of Dumouriez. After the battle of Jemmappes he conducted the successful retreat to Mons. In 1793 he distinguished himself at Aldenhoven, Maestricht, and Neerwinden, but was defeated at Wattignies. In the campaign of 1794, at the head of a corps of observation in West Flanders, he acted on the defensive against Pichegru, and was repeatedly beaten. Succeeding the prince of Coburg in the chief command in the Austrian Netherlands, he met with new defeats, and was compelled to recross the Rhine. In 1795 he was made field marshal, with command of the troops on the Rhine, defeated Jourdan, and stormed the intrenchments of the French before Mentz, compelling them to raise the siege of that city; and on Dec. 21 he concluded an advantageous armistice with the French republic. He was recalled to Vienna in January, 1796, and honored with the collar of the golden fleece and made councillor of state; but his command was given to the archduke Charles.

CLERGY (Gr. *κληρος*, lot, portion, heritage), a collective term commonly applied to all persons consecrated to the service of the church, because they are metaphorically said to be the portion or heritage of the Lord, as was the tribe of Levi under the Mosaic dispensation. Some, however, suppose that the term relates to the lot by which Matthias was selected to be an apostle; and others suppose it to be used as a technical term, simply denoting rank or degree. Among the Hebrews, Egyptians, and other ancient nations, a certain class of persons were set aside for the celebration of religious worship, and the Christian church from its very birth had its appointed pastors, or even, as the Roman Catholics and other episcopal denominations hold, its three clerical orders of bishops, priests, and deacons. Although the distinction between clergy and laity was perhaps not so strongly marked at first as it afterward became, the separation of ecclesiastics from ordinary secular affairs, and the appropriation of means for their support, dates from a very

early period. A practice of living in community, like the monks of the present day, appears, from the narrative of St. Luke in the Acts of the Apostles, to have originated with the clergy of Jerusalem; and though interrupted by persecution, it was not entirely abandoned until the distinction was made between secular and regular clergy, when the former ceased to live in communities. It was introduced into various parts of Christendom, and is mentioned by Bede as having been enforced in England by St. Augustin, acting under the orders of Gregory the Great. As the church emerged from poverty, the influence of the clergy became more and more palpable. They were revered not only as spiritual guides and ministers of the sacraments, but as the depositaries of nearly all the learning of the age, so that by the 12th century the term *clericus* became the common designation of every person of education. Civil rulers granted them numerous privileges and exemptions. No bishop could be compelled to appear before a secular court, no presbyter could be interrogated by the torture, no lay tribunal could take cognizance of ecclesiastical matters, nor were the clergy under the Roman empire subject to many of the taxes laid upon the people, or called upon to fill certain public offices. They obtained temporal jurisdiction not only over their own body, but over the laity, and in the German empire the sovereignty of many of the states was vested in them. They thus acquired in the process of time a preponderating influence in European politics, which, however much it may have been at times abused, was unquestionably the only barrier between popular rights and the encroachments of despotic princes, just as in former generations their spiritual influence over the barbarian invaders had saved Europe from slavery. During the middle ages, when the clergy formed a vast, disciplined, and wealthy body, dispersed throughout the known world, each member recognizing his proper superior, and all bowing before the supremacy of the bishop of Rome, this power reached its meridian, though from the days of the first Christian emperors to the most modern times the respective boundaries of secular and ecclesiastical authority have been a subject of contention in nearly every country of the old world. The clergy were anciently subjected to many disciplinary regulations, the chief of which are still in force in the Roman Catholic church, and some of them are observed among Protestant denominations.—In the Roman Catholic church, the ecclesiastical body embraces a hierarchy, which claims to have been instituted by Christ himself, and of which the visible head is the pope. According to the creed of this church, the government of the faithful was committed to St. Peter as the chief of the apostles, from whose successors in the see of Rome all other bishops derive their power to rule. Besides the orders of bishops, priests, deacons, and sub-

deacons, there are inferior officers who fulfil various functions connected with the sanctuary; these are acolytes, lectors, exorcists, and ostiaries, forming degrees by which candidates must ascend to the priesthood. Subdeacons are obliged to take a vow of perpetual celibacy, according to an ancient regulation founded upon a still older custom of the church. It is held that at the introduction of Christianity married men were permitted to take orders on condition of separating from their wives.—In the Greek church there are six orders of clergy, namely: bishop, deacon, subdeacon, lector, cantor, and liturgist. Every secular priest is required to marry a virgin before ordination, but is not allowed to marry a second time; and should his wife die he ceases to exercise the functions of his office, and enters a monastic order. Both Greek and Roman clergy are divided into regular and secular, the former comprising members of religious orders, and the latter all other ecclesiastics. The monks of the first ages were not necessarily connected with the clerical state; but subsequently monks were commonly ordained priests, though partially exempt from episcopal jurisdiction, while their abbots, even if not consecrated bishops, were clothed with episcopal authority, and wore episcopal insignia. The monks of the Greek church are under the same obligation of celibacy as their western brethren.—The church of England recognizes three orders of clergymen, bishops, priests, and deacons, who are comprised in the two provinces of Canterbury and York, each having its archbishop. Each bishopric is divided into archdeaconries, and each archdeaconry into parishes. The last are filled by incumbents who, when possessing the entire tithes of the parish, are styled rectors; when sharing them with lay patrons or cathedral chapters, are termed vicars; and when receiving a stipend from the proprietors of the tithes, bear the title of perpetual curates. Many of the livings are in the gift of laymen. The bishoprics are in the gift of the crown, which nominates a person to be elected by the cathedral chapter, and confirmed by the archbishop. The clergy meet by delegates in convocation at the beginning of every new parliament; though for a long period this practice was disused, the assemblage being regularly dissolved by the archbishop before it could proceed to business. A clergyman is exempt from jury duty, from attendance at a court leet, from arrest in civil suits while celebrating divine service, from filling the office of bailiff, constable, or the like; but, on the other hand, he cannot sit in the house of commons, engage in trade, or farm lands to the extent of more than 80 acres, or for the term of more than seven years. The clerical system of the Protestant Episcopal church in America resembles that of the parent establishment, except in local regulations, and in that it has no archbishops. Some other Protestant communions recognize degrees of

clerical dignity, and lay claim to an apostolic succession, but the majority believe in the ministry of only one order.

CLERGY, Benefit of. See **BENEFIT OF CLERGY.**

CLERK (Lat. *clericus*, from Gr. *κλῆρος*, portion or heritage), the designation of all ecclesiastics in the middle ages. The various usages of the word illustrate the influence exercised by the clergy in the affairs of learning and civil administration. After the barbarism of the northern tribes was transplanted southward, the ecclesiastical order alone retained acquaintance with ancient literature and some of the traditions of ancient scholarship. They were therefore esteemed a learned class, and clerk was synonymous with man of science. At the period of the renaissance it was a complimentary title for men of distinguished learning, even if they were not attached to the priesthood. Most of the high offices were in their hands, since they possessed above others the intelligence requisite for fulfilling them. As learning became more widely diffused, and other classes became qualified to administer affairs, the term clerk was gradually limited to its present signification of an officer in whose duties the keeping of records predominates; and it is now antiquated, except in legal papers, as an appellation of the clergy. Among classes of clerks, in their ecclesiastical capacity, were the *clerici acephali*, who were distinguished from the *clerici canonici* by not uniting in a congregation under the orders of a bishop; the clerks or brothers of common life, a congregation of regular canons which was originated by Gerard Groot of Deventer in the latter part of the 14th century, and spread throughout the Netherlands and Westphalia; and the regular clerks, who lived in community, with or without vows, and formed various congregations, as the Theatines, Barnabites, and Jesuits.—The ministers of France were formerly termed royal clerks and clerks of accounts. A large number of clerkships in the courts and government offices of England were abolished by statutes in 1832 and 1837; but several high officers are still designated by this title, as the clerk of the crown, who attends upon both houses of parliament, and issues writs of summons to peers and judges, and writs for the election of members of the house of commons; the clerk of the house of commons, who endorses the bills and signs the orders of the house, and reads whatever may be required in the course of proceedings; and the clerk of the parliaments, who is the chief ministerial officer of the house of lords, and waits upon the king or queen to receive the royal assent to bills, which he communicates to the lords.

CLERK, John, a British naval tactician, born at Eldin, Scotland, about 1730, died in 1812. He was a country squire who studied naval science, and is said to have disclosed in 1779 his discovery of a new mode of operation for breaking the enemy's line in naval battle, which was successfully applied by Rodney in

his victory over the French under De Grasse in the West Indies, April 12, 1782, and subsequently by other British commanders in many memorable encounters. Sir Howard Douglas, whose father had served under Rodney, contested Clerk's claim to the discovery; and it was asserted by others that Clerk had taken his "Essay on Naval Tactics" (privately circulated in 1782; republished 1790-'98, with additions; new ed., 1804; French translation by Lescallier, 2 vols., 1797) from Father Paul Hoste's *L'Art des armées navales* (Lyons, 1696 and 1727). The fact of his having never been in the naval service, or even at sea, strengthened his opponents; but Clerk's claim to the invention is generally regarded as substantiated.

CLERKE, Charles, an English navigator, born in 1741, died Aug. 22, 1779. He was educated at the naval academy of Portsmouth, and made his first voyage round the world as midshipman under Commodore Byron. In 1768 he sailed round the world a second time, accompanying Capt. Cook in the *Endeavor*, and was raised to the rank of lieutenant. In 1776 he was placed in command of one of the ships which formed the Cook squadron, and on the death of Capt. Cook in 1779 he succeeded to the chief command. The hardships which he was compelled to endure while searching for a passage between Asia and America broke down his health, and he expired off the coast of Kamtchatka, and was buried at Petropavlovsk.

CLERMONT, a S. W. county of Ohio, separated from Kentucky on the S. and S. W. by the Ohio river, touched on the N. W. corner by the Little Miami, and intersected by one of its branches; area, 462 sq. m.; pop. in 1870, 34,268. The soil is fertile, and the surface rolling and hilly. The Marietta and Cincinnati and the Cincinnati and Muskingum Valley railroads touch the N. W. corner. The chief productions in 1870 were 181,532 bushels of wheat, 878,027 of Indian corn, 325,755 of oats, 308,006 of potatoes, 19,535 tons of hay, 769,133 lbs. of butter, 39,425 of wool, and 1,219,762 of tobacco. There were 8,107 horses, 6,837 milch cows, 5,848 other cattle, 12,762 sheep, and 25,028 swine; 8 grist mills, 13 saw mills, 2 distilleries, 24 manufactories of furniture, and 1 of woollen goods. Capital, Batavia.

CLERMONT, or **Clermont-Ferrand**, a town of Auvergne, France, capital of the department of Puy-du-Dôme, 215 m. S. S. E. of Paris; pop. in 1866, 37,690. It is situated on a hill between the rivers Bedat and Allier, in a mountainous region at the foot of a range of extinct volcanoes, the highest of which is the Puy-de-Dôme mountain. A line of boulevards extends almost round the circuit of the town. In the place de Jaude, the principal square, is a statue of Desaix, and another square is named after the poet Delille, who, like that general, was born near Clermont. Pascal was a native of the town. The W. part of the cathedral, which was greatly damaged during the revolu-

tion, was pulled down in 1855, and has since been in course of restoration. The most ancient church is Notre Dame du Port, of the 11th century, with a modern tower and the statue of a black Virgin, reputed to have miraculous powers. The *palais de faculté* contains several museums and collections, and a public library with 30,000 volumes and curious ancient MSS. In the centre of the Cours Sablon, extending along the east of the town, is a fine fountain. There are two medicinal springs. The most famous, in the suburb of St. Alyre, called *la fontaine pétrifiante*, issues out of a volcanic tufa resting upon granite. A large stalactite forms a species of bridge, and both fountain and bridge are situated in a garden to which a bath house is attached. The town contains a society for science and fine arts, an academy, a lyceum, a medi-

first crusade was resolved upon, the badge of the cross worn by the crusaders being first adopted here. Clermont and Montferrand were separate towns till 1633, when they were united by avenues, 2 m. long.

CLERMONT-L'HERAULT, or **Clermont-Lodève**, a town of France, in the department of Hérault, 22 m. W. of Montpellier; pop. in 1866, 6,050. Cloth, silks, leather, cutlery, and pottery are manufactured here. The church of St. Guelhelm-le-Desert is a fine Romanesque structure.

CLERMONT - DE - L'OISE, or **Clermont-en-Beauvaisis**, a town of France, in the department of Oise, 35 m. N. of Paris; pop. in 1866, 5,743. It is pleasantly situated on the slope of a hill, and contains, besides a communal college and a public library, three remarkable architectural monuments—an old castle, a *hôtel de ville*, and the church of St. Samson. The castle has been converted into a prison for females, with about 1,000 inmates. It was a strong fortress between the 10th and 14th centuries, and was taken by the English in 1359 and 1434, and by Henry IV. in 1595. The elder Condé retired hither in 1615. The *hôtel de ville* was built about 1300, and is an extensive and beautiful edifice, of great interest to architects and antiquaries. It contains among other rare curiosities the funeral monument of a Greek who died in Gaul during the Roman dominion and was buried at Clermont. The church of St. Samson dates from the 14th century, and occupies the highest part of the town. The exterior is very striking, and the interior has a curious altar of carved wood, and other interesting carvings, and some fine paintings. The windows of painted glass are also remarkable. Clermont was the birthplace of King Charles the Fair (1294). It has considerable trade in cattle and horses, and linen and cotton goods and hosiery are manufactured.

CLÉRY, Jean Baptiste, celebrated for his devotion to Louis XVI., and as the faithful valet of the dauphin Louis XVII., born at Jardy, near Versailles, in 1759, died at Hietzing, near Vienna, May 27, 1809. Cléry was one of the few attendants permitted to share the prison of Louis XVI., who a few days before his death divided a loaf of bread with him as the only proof of regard he was able to show him. Cléry published the *Journal de ce qui s'est passé à la tour du Temple pendant la captivité de Louis XVI.* (London, 1798), which passed through many editions.

CLÉSINGER, Jean Baptiste Auguste, a French sculptor, born in Besançon about 1820. He studied under his father and in Italy, and acquired popularity in 1844 by his bust of Scribe. His subsequent works include a "Girl Bitten by a Serpent," a statue of Louise of Savoy, colossal busts of "Liberty" and "Fraternity," a statue of Rachel as "Phædra," and one of "Tragedy" for the théâtre Français; equestrian statues of Francis I. and of Napoleon I. as Roman emperor, for the Louvre; an admirable figure of a "Gypsy Girl," a bust of



Cathedral of Clermont.

cal and pharmaceutical school, a normal and a theological seminary, and schools of design, of trades, and of geology and botany. There is an active traffic in agricultural productions, and an important transit trade with Paris and southern France. Silk, linen, cotton, hemp, leather, cutlery, chemical articles, lava ware, and other goods are manufactured.—Under the name of Nemetum or Nemossus, Clermont was the capital of the Arverni, and was enlarged by Augustus, who called it Augustonemetum. Subsequently it was destroyed, and on being rebuilt it received the present designation from the castle of Clarus Mons, which defended the town, and it became the capital of Auvergne, sharing the subsequent fortunes of that province. It is one of the oldest bishoprics of France. The most celebrated of the many ecclesiastical councils held here was that of 1095, when the

Charlotte Corday; and two statues of Sappho. He has executed many other works relating to classical and mythological subjects. In 1867 he made busts of the emperor of Russia and of the king of Prussia (the present emperor of Germany) for the hôtel de ville, and in 1869 a statue of "Cleopatra in presence of Caesar." He married the daughter of George Sand.

CLEVELAND, a port of entry and the capital of Cuyahoga co., Ohio, the second city in size and importance in the state, situated on the S. shore of Lake Erie, at the mouth of Cuyahoga river, in lat. $41^{\circ} 30' N.$, lon. $81^{\circ} 46' W.$, 120 m. N. E. of Columbus, 225 m. N. E. of Cincinnati, and 170 m. S. W. of Buffalo. The growth of Cleveland has been very rapid, the population at the various decennial periods since 1810 having been as follows: in 1810, 57; 1820, 150; 1830, 1,075; 1840, 6,071;

1850, 17,034; 1860, 43,417; 1870, 92,829, of whom 38,815 were foreign born and 1,294 colored. Of the foreigners 15,856 were natives of Germany, 9,964 of Ireland, 4,008 of England, 2,634 of British America, 2,155 of Austria (proper), and 786 of Bohemia. There were 3,562 persons over 10 years of age who could not read, and 4,575 who could not write, of whom 3,748 were foreign. There were 16,182 families, with an average of 5.32 persons to a family. The population is now (1873) estimated at more than 150,000. The city received its first impetus from the completion in 1834 of the Ohio canal, which connects Lake Erie at this point with the Ohio river at Portsmouth. A further stimulus was given after 1850 by the development of the railroad system, and since 1860 its prosperity has been increased by the rapid extension of manufacturing industry.



Cleveland, from the Reservoir.

The greater portion of the city is built on a gravelly plain, elevated from 60 to 100 ft., and overlooking the lake. The river passes through it in a winding course, dividing it into two parts, and affords several miles of dock front. The harbor has been improved by the dredging out of a commodious ship channel, which branches from the river near its mouth, and by the erection of two piers, 200 ft. apart, stretching several hundred feet into the lake. On the E. pier is a lighthouse, and another stands on the cliff above.—Cleveland is laid out with much taste, chiefly in squares. The principal streets are from 80 to 120 ft. wide, Superior street having a width of 132 ft., and are lighted with gas and well paved. The abundance of shade trees, chiefly maple, has given to it the title of the "Forest City." The business blocks are mostly of brick and stone, from

three to five stories high, and a large proportion of the dwellings are of the same materials. Euclid avenue is lined with elegant residences, each surrounded by ample grounds, and is considered the handsomest street in the country. Prospect street, parallel to the avenue, ranks next in beauty. River and Merwin streets, on the E. bank of the Cuyahoga, are occupied by the produce and shipping houses, and by many of the wholesale grocery stores. The jobbing business is principally in Water street, while Superior street is occupied by the larger retail stores, the banks, and the bookstores. The retail grocery, provision, and fruit stores are situated mostly in Ontario street, S. of the public square. This square, known as Monumental park, which occupies 10 acres near the centre of the city, was formerly open to foot passengers only, but since 1866 it has been divided

into four smaller squares by the extension of Superior street from E. to W. and of Ontario street from N. to S. The square is shaded with trees, and is carefully kept. In the N. W. corner there is a handsome fountain; in the S. W., a pool and cascade; in the centre stands a statue of Commodore Perry, the hero of the battle of Lake Erie, erected in 1860 at a cost of \$8,000. The pedestal is of Rhode Island granite 12 ft. high; the statue itself is of Italian marble, and is 8 ft. 2 in. high. In front of the pedestal is a marble medallion, representing the passage of Perry in a small boat from the Lawrence to the Niagara during the battle. West of the river is another park, called the Circle, which has a fountain in the centre, and is finely adorned with shade trees. The city cemetery is on Erie street; it is laid out with rectangular walks, shaded with trees, and contains many tasteful monuments. Woodlawn cemetery, more recently opened, is on the E. boundary of the city. It is prettily laid out, with paths winding among the native trees, and is rich in monuments and statuary. Lake View cemetery, containing 300 acres, 250 ft. above the level of the lake, was opened in 1870, on Euclid avenue, about 5 m. from the city. There is also a Roman Catholic cemetery, and a fifth on the W. side of the city. The water works stand near the lake, W. of the river, and to Jan. 1, 1870, had cost \$798,243 52. By means of a tunnel 5 ft. 2 in. high and 5 ft. wide, extending 6,600 ft. under the lake, pure water is obtained, which is forced by two powerful engines into a large reservoir, occupying the highest point W. of the river, whence it is distributed through the city. The United States building, containing the custom house, post office, and federal courts, the county court house, and the city hall are fine buildings of stone. Case hall, a beautiful edifice near the park, built in 1866, contains, besides the rooms of the Cleveland library association, a hall capable of seating 1,500 persons. The house of correction, on the E. border of the city, is a large and splendid building. The Cleveland medical college occupies an imposing structure on the corner of Erie and St. Clair streets. The city infirmary is five stories high, and cost \$25,000. The union railway depot, a massive stone structure, built in 1866, is one of the largest buildings of the kind in the world. The two high school buildings are handsome edifices of brick and stone, and several of the churches are noteworthy structures. Several bridges cross the Cuyahoga, connecting the different portions of the city, and there are seven street railroad companies.—The steam railroads terminating at or passing through Cleveland are as follows: the Lake Shore and Michigan Southern; Cleveland, Columbus, Cincinnati, and Indianapolis; Atlantic and Great Western (Mahoning division); Cleveland and Pittsburgh; and Cleveland, Mt. Vernon, and Delaware. These roads and the canal connect the city with the coal

fields and grain districts of the state, and the oil region of Pennsylvania, while several lines of steamboats run to the various lake ports. The trade with the Lake Superior mining region is important, and large quantities of copper and iron ore are shipped thence to this port. The trade in wool and lumber is also extensive. The following table exhibits the receipts and shipments of bituminous coal, in tons of 2,000 lbs., from 1865 to 1870:

YEARS.	Received by canal.	Received by rail.	Total receipts.	Shipments.	Consumed at Cleveland.
1865.....	153,112	307,438	460,550	214,837	245,713
1866.....	171,569	404,826	576,393	279,840	296,533
1867.....	125,192	444,814	632,016	324,027	297,989
1868.....	197,475	547,964	745,439	392,388	333,051
1869.....	225,401	655,211	910,621	396,067	524,555
1870.....	120,000	774,000	894,000	482,390	411,610

The trade in anthracite coal amounts to about 10,000 tons per annum. The foreign trade is exclusively with Canada. The imports for the year ending June 30, 1872, amounted to \$584,576; the exports were valued at \$893,172. There were entered from foreign countries 312 American vessels, of 86,753 tons, and 252 foreign vessels, of 46,479 tons; cleared for foreign ports, 274 American vessels, of 52,693 tons, and 269 foreign vessels, of 47,316 tons; entered in the coastwise trade, 599 steamers, of 395,174 tons, and 2,289 sailing vessels, of 450,501 tons; cleared, 590 steamers, of 396,618 tons, and 2,333 sailing vessels, of 467,234 tons. The total number of vessels cleared in 1863 was 3,109, with an aggregate tonnage of 1,112,696; in 1872, 3,466, with an aggregate tonnage of 963,861. In the latter year there were registered, enrolled, and licensed at this port 446 vessels, of 66,013 tons, including 181 sailing vessels of 40,076 tons, 60 steamers of 15,294 tons, 201 canal boats of 10,173 tons, and four barges of 469 tons. There were built during the year 5 sailing vessels of 2,229 tons, and 2 steamers of 1,598 tons.—The manufactures, particularly of iron and coal oil, are very important. In the production of refined petroleum the city is second only to Pittsburgh. Other important products are sulphuric acid, wooden ware, agricultural implements, marble and stone, grindstones, railroad cars, and white lead. Pork packing is also carried on to some extent, 36,415 hogs having been packed during the season of 1870-'71, and 35,010 in 1871-'72. There are 50 incorporated companies (chiefly manufacturing), of which 38 have an aggregate capital of \$11,690,000. According to the census of 1870 there were 1,149 manufacturing establishments in Cuyahoga county, most of them in Cleveland; steam engines, 274, of 9,388 horse power; water wheels, 55, of 2,179 horse power; hands employed, 10,063; capital invested, \$13,645,018; wages paid, \$4,539,065; value of materials, \$16,861,357; of products, \$27,049,012. The following table exhibits the principal manufactures:

ARTICLES.	No. of establishments.	Capital.	Value of Products.
Agricultural implements.....	3	\$259,000	\$145,500
Boats.....	2	141,300	257,860
Boots and shoes.....	9	67,200	202,292
Bread, &c.....	26	79,700	283,114
Breweries.....	25	449,500	511,050
Brick.....	23	42,800	113,700
Bridge-building.....	2	175,000	536,000
Cheese.....	14	40,450	202,565
Clothing.....	77	211,105	588,889
Coal oil, rectified.....	16	520,000	4,283,065
Coffee and spices, ground.....	3	160,700	207,500
Cooperage.....	63	283,700	1,051,755
Edge tools and axes.....	2	88,000	96,000
Flour mills.....	13	744,500	1,903,155
Furniture.....	29	291,400	505,975
Gas.....	1	525,000	232,792
Gunpowder.....	1	150,000	165,000
Iron, forged and rolled.....	8	1,190,000	2,290,784
" bolts, nuts, &c.....	3	175,000	222,000
" nails and spikes, cut, &c.....	3	65,150	127,480
" pipe, wrought.....	2	47,500	169,000
" pigs.....	2	120,000	398,000
" castings (not specified).....	12	808,000	1,097,000
" stoves, heaters, &c.....	4	355,000	270,000
Leather, tanned.....	10	68,400	178,844
" curried.....	9	48,200	115,814
Lightning rods.....	1	150,000	150,000
Lime.....	3	36,700	85,400
Lumber, planed.....	7	69,000	183,300
" sawed.....	32	80,900	170,512
" staves, shooks, &c.....	2	8,500	132,400
Machinery (not specified).....	14	150,100	178,445
" railroad repairing.....	3	1,225,000	997,070
" engines and boilers.....	11	159,300	406,300
Malt.....	5	331,500	282,500
Matches.....	1	250,000	110,000
Paints.....	4	185,000	244,400
Paper.....	3	390,000	531,175
Pianos.....	8	81,000	113,530
Pork, packed.....	4	195,800	1,195,570
Printing, newspaper.....	9	91,500	151,740
" job.....	5	54,500	118,550
Saddlery and harness.....	33	41,330	115,400
Sashes, doors, and blinds.....	8	314,500	344,500
Sewing machines.....	2	46,000	290,000
Steel springs.....	1	70,000	100,000
Sulphuric acid.....	2	32,000	63,500
Tin, copper, and sheet-iron ware.....	50	163,460	234,495
Tobacco and snuff.....	2	60,000	387,000
" cigars.....	52	118,250	450,896
Tombstones.....	5	159,400	325,500
Wagons.....	47	162,200	264,296
Wooden ware.....	3	254,000	397,500
Woolen goods.....	5	251,000	211,100

Cleveland contains 6 national banks, with an aggregate capital of \$4,300,000, 2 savings banks, and 9 insurance companies (2 life), with a capital of \$1,950,000. There are 31 hotels and 3 markets.—The city is divided into 17 wards, and is governed by a mayor and common council of two members from each ward. There are also a clerk, who is likewise clerk of the common council, an auditor, a treasurer, a solicitor, a street commissioner, a civil engineer, and a superintendent of markets. The board of improvements consists of the mayor, street commissioner, engineer, a clerk, and two other members; the board of health is composed of the mayor, health officer, and six others. The United States circuit and district courts for the northern district of Ohio are held here; also the state district court, the court of common pleas, a probate and a police court. The board of metropolitan police consists of the mayor, a secretary, and a superintendent. The city is

divided into 5 precincts, and the force, besides the privates, is composed of a captain, 6 sergeants, 3 acting sergeants, 3 detectives, and 3 special detectives. The fire department is under the control of a chief engineer and 2 assistants. There are 7 steam engines, 2 hook and ladder companies, and a fire alarm telegraph, under the charge of a superintendent. The assessed value of property in 1870 was \$51,841,746.—There are several well conducted reformatory and charitable institutions. The house of correction is under the charge of a board of directors. The city infirmary, to which the sick and homeless poor are taken, has attached to it a good farm, which is worked by the inmates of the institution. Connected with the infirmary is a house of refuge for children, where they are instructed and taken care of until of an age to maintain themselves. St. Vincent's male orphan asylum contains 150 orphans under the charge of the sisters of charity, and St. Mary's female orphan asylum, under the charge of the ladies of the Sacred Heart of Mary, has 160 inmates. The "little sisters of the poor" provide for 70 aged men and women. The Cleveland orphan asylum is supported by voluntary contributions, and by an endowment fund of about \$54,000. The Episcopalians have a home for sick and friendless widows, and the Jews support an orphan asylum. A United States marine hospital has been established here, and is situated on the border of the lake. The charity hospital, established partly by the city and partly by subscriptions, is attended by the sisters of charity. There are also a homœopathic hospital and a city hospital. In the industrial school poor and homeless children are provided with food and shelter, and are taught the common branches of education, sewing, domestic labor, and brush making. The public schools are under the control of a superintendent and a board of education of one member from each ward, and consist of 2 high schools and 16 grammar and primary schools. The average attendance of pupils in 1871 was 8,175, of whom 4,133 were males and 4,042 females, the number of teachers was 187, of whom 9 were males; the receipts were \$145,049 67 from taxation, and \$48,457 69 from the state fund; expenditures, \$143,700 95, of which \$118,655 were for teachers' wages and \$27,880 69 for sites and buildings. The Cleveland female seminary had 13 instructors, 100 pupils, and a library of 1,000 volumes; the Union business college had 6 teachers and 448 pupils. There are two German and English schools, 7 other seminaries and schools belonging to Protestant societies, 11 Roman Catholic academies and schools, and 6 private and select schools. The Ohio State and Union law college in 1871 had 2 professors, 28 students, and a library of 2,500 volumes. The Cleveland medical college (medical department of the Western Reserve college at Hudson) and the medical department of the uni-

versity of Wooster are situated here. The homeopathic hospital college, founded in 1849, which admits females, in 1871 had 17 professors, 86 students, and a library of 2,000 volumes. St. Mary's ecclesiastical seminary (Roman Catholic) has 3 professors and 25 students. The Western Reserve historical society has its seat here. The Cleveland library association have a reading room and a library of 12,000 or 15,000 volumes. The public library, opened in 1869, contains about 8,500 volumes. There are 6 daily newspapers (1 German), 3 tri-weekly, 1 semi-weekly (German), 10 weekly (2 German and 1 Bohemian), and 1 semi-monthly and 7 monthly periodicals. The principal place for dramatic entertainments is the academy of music, besides which there are a Bohemian theatre, a German theatre, a theatre comique, and various other public halls for lectures, &c. The freemasons have 2 halls and 13 lodges, chapters, &c., of which 1 is for Germans; the odd fellows have a hall, 2 encampments, and 10 lodges (2 German). There are 10 temperance societies, and 25 lodges, &c., of other orders. The city contains 88 churches, divided as follows: 7 Baptist (1 German and 1 colored), 1 Bible Christian, 13 Roman Catholic (1 Bohemian, 1 French, and 4 German), 1 Christian, 5 Congregational (1 colored), 1 Disciples', 2 Evangelical (German), 4 Evangelical Association (3 German), 2 Evangelical Lutheran (German), 2 Evangelical Protestant (1 German), 1 Free Will Baptist, 1 Friends', 2 Jewish, 15 Methodist (2 German and 1 colored), 7 Presbyterian, 11 Episcopal, 4 Reformed (3 German), 1 Spiritualist, 1 Swedenborgian, 1 Unitarian, 3 United Evangelical (1 German), 1 United Brethren (German), 1 Universalist, and 1 miscellaneous. There are a young men's Christian association, a women's Christian association, 2 convents, and 2 other Catholic religious associations.—Cleveland was laid out in 1796, and was named in honor of Gen. Moses Cleaveland, a native of Connecticut, under whose charge the first surveys in what is known as the Western Reserve were made. It was until 1806 confined to the E. shore of the Cuyahoga, and was an important strategic point in the war of 1812. A portion of what is now the city of Cleveland was incorporated as a village in 1814. A city charter was granted in 1836.

CLEVELAND, Charles Dexter, an American author, born at Salem, Mass., Dec. 3, 1802, died in Philadelphia, Aug. 18, 1869. He graduated at Dartmouth college in 1827, and was professor of Latin and Greek at Dickinson college, and afterward of Latin in the university of New York, till 1834. He then taught a school for young ladies in Philadelphia till 1861, when he was appointed United States consul at Cardiff, Wales. He published "The Moral Characters of Theophrastus" (1827), "Compendium of Grecian Antiquities" (1828), "Compendium of English Literature" (1850), "Hymns for Schools" (1850), "English Literature of the Nineteenth Century" (1851), "Compen-

dium of American Literature" (1858), "Compendium of Classical Literature" (1861), and "Lyra Americana" (1868).

CLEVELAND, Grover. See supplement.

CLEVELAND, Henry Russell, an American author, born in Boston in 1809, died in St. Louis, June 12, 1843. He graduated at Harvard college in 1827, prepared an edition of Sallust, wrote "The Life of Henry Hudson" in Sparks's "American Biography," and was a frequent contributor to literary periodicals. A collection of his writings, edited by G. S. Hillard, has been published (Boston, 1844).

CLEVENGER, Shobal Vail, an American sculptor, born at Middletown, Ohio, in 1812, died at sea, Sept. 28, 1843. In his youth he worked as a stonecutter in Cincinnati, where the figure of an angel which he carved on a tomb attracted attention. From Cincinnati he removed to Boston, where he executed busts of Webster, Clay, Van Buren, and others. He afterward went to Europe, taking up his residence at Florence, where he executed many busts, which showed a rapid advance, and gave promise that he would attain the first rank in his profession. Having been attacked by pulmonary consumption, he embarked for America, but died on the passage.

CLEVES (Ger. *Kleve* or *Cleve*), a town of Rhenish Prussia, in the district and 48 m. N. W. of the city of Düsseldorf, about 4 m. from the Dutch frontier and the Rhine; pop. in 1871, 9,038. It is built upon three gently sloping hills, in a fertile region with extensive valleys and woodlands, which in the 17th century were converted into pleasure grounds by Prince John Maurice of Nassau-Siegen, whose iron tomb is near the town. The mineral spring in the Thiergarten was restored in 1846, and a drinking hall and bath house were added in 1847. The castle of Schwanenburg, the former ducal residence, and the birthplace of Anne of Cleves, the fourth wife of Henry VIII. of England, is famous for its picturesque tower, said to have been built by Caesar. It is now used as a prison and for public offices. Among the other public buildings are the Prinzenhof, belonging to the princess of Waldeck; a Roman Catholic church, with monuments of the counts of Cleves; and places of worship for Protestants, Mennonites, and Jews. There are several schools and a gymnasium, and a monument of the elector of Brandenburg, John Sigismund, by Bayerle. It is connected with the Rhine by a canal, and by railway with other parts of Germany and with Holland. There are manufactories of cotton, leather, and tobacco.—Cleves was formerly the capital of a county, and subsequently of a duchy, which formed part of the Westphalian circle of the German empire, and in 1609 fell to Brandenburg, with the exception of a portion annexed to Neuburg. By the treaty of Lunéville (1801) a part of the duchy was ceded to France, and a part was in 1806 incorporated with the grand duchy of Berg. In 1815 the whole was restored to Prus-

sia, except some districts on the Maas, and a few villages which were claimed by Holland.

CLIENT (Lat. *cliens*, according to some from an old Latin verb, *cluere*, to obey), in Roman antiquity, a man of inferior class, or lower situation, connected for mutual service and obligation with a citizen of better standing, in this relation called patron (*patronus*), or protector. This relation of client and patron (*clientela*), which seems to have been of great historical importance in the first centuries of the Roman state, is said to have been introduced by Romulus, in order to form a social link connecting the two separate and naturally antagonistic bodies of Roman society, the patricians and the plebeians. Some even believe that at the earliest period of Roman history the names patricians and patrons were identical, and that the clients embraced the whole bulk of the plebs. But this supposition, though founded on testimony of ancient date, can hardly be proved, the history of this institution in general being involved in great obscurity. According to Dionysius, whose history contains a summary of the mutual obligations of clients and patrons, together with a historical sketch of the institution, both of doubtful accuracy, the patron was the legal adviser and paternal protector of the client, and bound to assist him in need or danger; the client was bound to filial respect and reciprocal assistance, to contribute to the portion of the patron's daughters in case he became poor, to ransom him if made captive, and to vote for him or his friends when standing for office. The client and patron were not allowed to sue or to bear witness against each other, and had religiously to abstain from any injury to each other. The client accompanied his patron in war, being in this respect similar to the vassal of the middle ages, and bore his family name, partaking in the sacrifices and sepulchre of the *gens* with which he was thus associated. If he died without an heir, his patron (according to Niebuhr) inherited his property. The wife of the latter was the *matrona* or patroness of the protected family. Illustrious families found their pride in the number of their clients, and strove to gain new ones, the relation being hereditary. Freedmen became natural clients. It is stated that Romulus, regarding the connection as a religious tie, and an infringement upon its duties as a sacrilegious act, bestowed upon clients the right of unlimited self-defence against tyrannical patrons, but this can hardly be accepted. Whatever the original condition of the clients may have been, their situation was made more favorable by the constitution of Servius Tullius, admitting the plebeians to a regular share in the political affairs of the state. Though greatly modified in the course of time, the institution maintained itself down to the period of the emperors. Foreigners also often stood under the protection of distinguished Roman citizens, chosen as patrons. Even foreign states which were in alliance with Rome had their patrons

there, and the senate often referred international disputes to the respective patrons. Similar institutions are said to have existed at an early age among other nations of Italy.—In modern usage the term client designates a person who commits his legal cause to a lawyer.

CLIFF DWELLERS. See supplement.

CLIFFORD, William K. See supplement.

CLIFTON, a watering place of Gloucestershire, England, now forming a suburb of Bristol; pop. in 1871, 20,701. It is built on the southern acclivity of a steep cliff, nearly at the top of which is York crescent, a fine row of houses. Above this are Clifton down and St. Vincent rocks, 300 ft. high, crowned by an observatory. In some places the rock rises perpendicularly, and the Avon flows through a deep gorge, which is crossed by a suspension bridge of 702 ft. span and 260 ft. above the river. The bridge was built after designs by



Clifton Suspension Bridge.

Brunel, and partly from funds left by Alderman Vick in 1753; but owing to lack of money it was long in an unfinished state, and was not completed till 1864. Clifton is the seat of a Roman Catholic bishop, and near it is Stapleton, the palace of the Anglican bishop of Gloucester and Bristol. Clifton college occupies an area of 15 acres, and comprises a gymnasium, boarding houses, schools, and chapels. There is a fine zoological garden. The scenery of the neighborhood is romantic. The hot spring, situated at the foot of St. Vincent rocks, has a temperature of 76° F., and discharges about 40 gallons a minute. The principal mineral ingredients of the water are salts of lime, and when it is drawn into a glass a few bubbles of carbonic acid gas are emitted. The water is useful in many disorders. The spring has been known for centuries, but was first enclosed by the corporation of Bristol in 1690. There are now a pump room and hot and cold baths. The climate is salubrious, though strong winds prevail from the west and southwest. Rain frequently falls, but owing to the absorbent nature of the soil the ground soon dries.

CLIMATE (Gr. *κλίμα*, Fr. *climat*), the condition of any portion of the earth's surface in respect to temperature, moisture, and other atmospheric phenomena. The Greek original (from *κλίνειν*, to slope or incline) was employed to signify the obliquity of the sphere, to which the inequality of the length of the day was due, the word primarily signifying an inclined plane or slope; hence applied to a belt or zone of the earth's surface differing, for the reason above given, from another or contiguous belt in the length of its day. The geographer Ptolemy was the first to establish these belts and to define them as climates; dividing the surface from the equator to the 58th parallel into 25 such climates, differing a quarter of an hour each in the length of the longest day; next from the 58th to the 63d parallel making four climates of one half hour's difference each, and from the 63d to the 66th parallel three climates of one hour each. From the polar circle to the pole there were six climates of one month's difference each. At the equator the first belt was 4° 15' in width, diminishing gradually till at the 45th parallel it was 1° 50' in width, and at the 57th parallel 30' only. This irregular and fanciful division long remained, in consequence of the difficulty of attaining to any positive basis of distinction on astronomical or purely geographical grounds. As discoveries extended in all directions, and particularly to western Europe, distinctions founded on latitude or length of the day were found to be inapplicable and valueless, and they fell into disuse long before observation began with the instruments now in use to measure the heat, the weight of the air, &c. With the invention of these instruments the word climate came to signify the aggregate of atmospheric conditions affecting organic existence, animal and vegetable; and particularly the degree of heat, the winds, the rain, the changes in atmospheric weight, and all like sensible conditions. The barometer, developed from the Torricellian vacuum in 1643, was the first instrument suited to exact observation; soon afterward expansible fluids were used as measures of heat, and good spirit thermometers were in use in 1680. But it was not till 1730 that mercury was substituted for spirit in part, and permanent series of observations began to be recorded; the first in America being at Charleston by the learned Dr. Lining in 1738. Great activity existed near the close of the 17th century, when these instruments were novel, and when positive and even mathematical precision was hoped for through records of their observation; and the earlier "Philosophical Transactions" of the royal society are full of papers and discussions on the subject. But it was soon found that there was no parallel in this to other departments of physics, and interest in it greatly declined until the new and broad generalizations of Humboldt were put forth. To Sir William Herschel and Alexander von Humboldt the world is chiefly indebted for the rapid progress

made in the science of climatology within the present century. Humboldt in 1817 published his celebrated treatise entitled *Des lignes isothermes, et de la distribution de la chaleur sur le globe*, in which he showed that the decrease of heat with the increase of latitude takes place more slowly on the west coasts of the old world than on the east of the new. He connected places having an average amount of temperature during the year by isothermal lines, the convex summits of which fell near the west coast of the old world, and their concave near the east coast of the new. By combining the decrease of temperature by increasing elevation with its decrease by increasing latitude, he represented the intersection of isothermal surfaces with a vertical plane cutting the surface of the earth along a meridian, and showed that if the examination of places of equal summer heat and equal winter cold were conducted in a similar manner by drawing isothermal and isochimal lines, the difference between a sea and a continental climate would be included in the general view. These isothermal lines differ materially from the parallels of latitude. It is not necessary to enter into detail as to how the annual rotation and oblique motion of the earth in relation to the sun fix the tropical limits of the sun's apparent declination south and north of the equator, and produce alternate winter and summer on either side of the line, as it will be evident that the mean annual temperature obtained at different latitudes must decrease from the equator to the poles. Had the whole surface of the earth been uniform, presenting the like relations to radiant heat, unaffected by the unequal action of disturbing causes, the mean temperature of every point would have been in proportion to the radius of the parallel of latitude. But the mean temperature of places in the same lines of latitude differs very materially. The isothermal line, for example, of 59° F. traverses latitude 42° in Europe, but descends to latitude 35° in America. Hence it appears that the mean annual temperature in the latitude of Beaufort, N. C., 34° 41', is nearly the same as that of Rome in latitude 41° 54'; and it consequently follows that other causes are in operation in both of these different localities affecting the mean temperature than nearness to or remoteness from the equator. Accurate and long continued observations are necessary to give value to meteorological facts. These have been pursued of late with much zeal. Kämtz and Mahlman have carefully represented annual isothermal lines, but Professor Dove was the first to reduce these to monthly temperatures. The observations of Professor Dove were first published in the "Transactions of the Royal Academy of Sciences" in Berlin, in 1846, and have since appeared in the "Transactions of the British Association." These observations, which are of great value, and place their author among the first of living meteorologists, fully sustain the views of Humboldt, and natu-

rally lead to an examination of the physical formation of the earth, as a cause of this great discrepancy in climate in the same parallels of latitude. According to Malte-Brun, climate is the assemblage of all those external physical and natural circumstances connected with each particular locality, which have a bearing upon the modifications of its temperature. This definition, adopted by M. Virey in the *Dictionnaire des sciences médicales*, and by M. Foissac in his work entitled *De l'influence des climats sur l'homme*, is susceptible of embracing all those phenomena involved in the complex study of physical climate, which are so varied in character, and frequently so little allied to each other, as to forbid their exact and rigorous classification. —The actual climates of the earth, as practically experienced by its living forms, animal and vegetable, are greatly diversified and highly irregular. The averages or fixed quantities for different latitudes and localities are widely variable, and the non-periodic range of the leading conditions is even more extreme. The causes of this marked exception to the otherwise well defined character of all movements of matter, and the reason why this department of physics cannot, in the present state of knowledge at least, and probably not at any time, be the subject of precise analysis, may be seen from the following general statement. It is already admitted as certain that the various climates cannot be defined by any astronomical conditions, or by the form and movements of the earth relatively to the sun. Yet the heat received from the sun is the fundamental condition and controlling cause in all cases, and it acts both directly and through the secondary agencies of æriform fluids and all mobile forms of matter. That is, the heat of the sun's rays is one part of the supply, as those rays fall direct on the surface, while air, atmospheric vapor, and water are also powerful agents in receiving and diffusing heat, bringing the direct product of the sun's power, as received in the tropics, far northward to soften the climates which cannot receive sufficient heat directly. The power of this tropical heat is enormous. Not only are animal and vegetable forms stimulated by it to their largest growth, but the whole inorganic mass capable of motion is put in active circulation. By this heat the air is rarefied and given rapidity of circulation, at the same time that vast volumes of water are converted into vapor, capable of absorption and diffusion almost throughout the entire aerial mass. This system of air and water circulation causes, as one general result, the evaporation and subsequent precipitation in rain of a sheet of water that may be stated as being ten feet deep at the equator, six feet deep on the average in the tropics, three feet deep at the 45th parallel, and one foot deep or less at the Arctic circle. This vapor, being raised by heat, is precipitated in rain as the heat is dissipated; and this absorption and diffusion are

also concurrent with a systematic movement of the æriform mass, a movement which in the tropics is against the rotary movement of the solid mass of the earth, and probably is due in part to simple retardation of these fluid volumes, relatively to this solid portion. An inward and upward movement within the tropics, consequent upon this heat and saturation, originates the great system of atmospheric circulation, and distributes to the temperate latitudes most of the moisture there deposited. A surplus of heat is also so diffused, and through these joint agencies the actual climates of a large portion of the earth's surface are established. And as the middle or temperate latitudes are in the direct path of the returning atmospheric current, the more striking general phenomena these climates present are easily explained in this connection. In passing northward and descending to the surface, these volumes of heated and saturated air lose their surplus of heat and most of their contained moisture; and in moving from west to east in these latitudes this circulation brings mild temperatures and local humidity from any ocean surface traversed; hence the profuse rains and moderate heats of the western coasts of both continents. In the interior, the same circulation continuing, there are alternations of both conditions; the heat being greater in the season of greatest heat and less in the cold season than on the coasts, and the rains being alternately profuse and deficient. The degree of these alternations is increased until the immediate eastern boundary of the continents is reached, when a limited and local maritime influence appears to neutralize the agencies prevailing on the interior surface. Climates distinctly maritime, or directly controlled by adjacent water surfaces, exist in but few positions on the eastern borders of the continents. At Norfolk, Newport, Nova Scotia, and Newfoundland on the Atlantic coast, there are quite decisive maritime influences—particularly at or near Newport, and over most of the Nova Scotian peninsula; but these are due to unusual exposure, and close proximity to the Gulf stream.—Next to the atmospheric circulation in its influence on the actual distribution of heat is the movement of great sea currents. These currents are caused by the same tropical excess of heat, with its consequent rarefaction of the fluid mass of the equatorial latitudes. A movement westward within the tropics is arrested by the continental masses of both America and Asia, and deflected in the gulf of Mexico and on the coast of China, forming the Gulf stream of the Atlantic and the Kuro Siwo of Japan and the Pacific. These great currents move northward on the surface of vast seas, diffusing their excess of heat, and greatly modifying the climate of the land surfaces within their reach. This agency is especially powerful on the western coast and islands of Europe, deflecting the atmospheric circulation itself, charging the air with hu-

midity, and rendering the general climate exceptional in the highest degree. Also in the Pacific ocean the agency of the Japan current is very great in bearing heat and moisture to higher latitudes than they otherwise would go. The western coast of America, from San Francisco to Behring strait, is bathed in this warm and softening influence, receiving much more of both heat and its attendant conditions than the atmospheric circulation alone would bring. In the southern hemisphere a similar but less powerful movement of the sea currents attends the atmospheric circulation, with consequences generally similar in modifying the climate of the land surfaces, but less striking and important. There are also in both hemispheres returning cold currents of much local importance, affecting the climate of certain tracts on the immediate coasts. The most important of these is the cold deep-sea current of the Pacific ocean, which, returning southeastward from the northern areas of that sea beneath a warm surface current, impinges on the W. coast of North America, and rises to the surface from the mouth of the Columbia river to Monterey, giving rise to the extraordinary cold day winds of summer at San Francisco, and over a long line of that coast. This very striking fact finds no solution in any general theory of distribution of heat, either as received direct from the sun or as modified by atmospheric circulation, with its attendant standards of maritime and continental influences. It is due solely to the aqueous circulation, in a phase unknown to the eastern continent. As the result of this great diversity of controlling influences, there can be no determination of the leading conditions of climate otherwise than by observation. Even with certain standards for the equatorial belt and for the poles, as has sometimes been assumed, there can be no formula for interpolating the measures of heat or of humidity for the intervening latitudes; and observation must be continued for a period sufficient to cover the average of non-periodic variations above and below a true mean. These non-periodic changes are very great, and both in their degree and origin are in the present state of knowledge to a great extent inexplicable. An average for ten years is, however, nearly sufficient to give a true mean or fixed quantity in any of the conditions: the temperature, the fall of rain, and the date of significant changes, as the freezing or opening of rivers, the opening and closing of the season for growth of plants, &c. Observation of the leading conditions of climate has made great progress within the past half century, and a remarkable degree of continuous and faithful attention to the record of such observations has been shown by citizens and public institutions in the United States since 1820, while valuable and almost continuous series exist for some localities for a long time previous to that date, the earliest having been begun in 1738. In Europe the records of instrumental observation are but lit-

tle more extended, the earliest being about 1720.—Anterior to the discovery of instruments suited to measure the degree of heat, the weight of the atmosphere, &c., the tone of speculation and discussion of climatological laws was very loose, and full of highly imaginative views and conjectures. With the invention of the thermometer and barometer a new impetus was given to the study of climatological physics, and a vigorous attempt was made to apply positive measurements and to discover absolute laws. But it soon became apparent that the range of non-periodic phenomena was too great, and that the differences were too striking which were disclosed in the comparison of localities which should, so far as could be seen, very nearly agree, to admit of calculation on recognized physical laws. A long period then elapsed in mere waiting for the requisite basis of observed facts on which a legitimate and safe induction could be founded, and this period had not closed when Humboldt published his striking and effective generalizations, a system of illustration of the distribution of heat by isothermal lines. Time has not yet been afforded for the accumulation of observations of sufficiently extended periods over more than a small portion of the earth's surface, and it is not possible yet to fix the distribution of heat with accuracy over any considerable part of the southern hemisphere. But the general outline of a positive climatology put forth in Humboldt's treatise has been greatly extended and filled up by subsequent labors, until it has attained a fixed position among scientific determinations. The leading condition determined is the mean temperature; next to that is the average rainfall, and next the resultant or average direction of the winds. The barometric measurements have been equally well established; and also the range or measurement of departure of each of these conditions from the mean, both periodic and non-periodic. The hygrometric condition, or the proportion of suspended moisture in the air, has been less generally observed, but it is recognized as a necessity in the proper definition of climates. For all these the periods of observation in many parts of Europe and of the United States are ample, covering, as has already been said, more than a century at a few stations. But the necessity for a wide-distribution of observed positions delays the most important of the uses to which these observations may be put. We turn, therefore, from the discussion of the ultimate laws concerning the principal conditions of climate, to the consideration of the remarkable facts of actual climate in the countries where determinations are recent. In the eastern part of the United States the facts have been long known, but in the interior and the west much is new. While the refrigeration originating with the mere presence of great continental areas is great, and develops a continual series of violent alternations of temperature over much of the surface in the

entire valley of the Mississippi, there is a novel change apparent in going westward to the foot of the Rocky mountains, the degree of heat increasing not only relatively but positively, being greater at considerable altitudes of the great central plateaus than on the Atlantic coast in the same latitudes. Thus at Fort Benton, Virginia City, Laramie, and Denver, points at various altitudes from 2,500 to 6,000 ft. above the sea, at the eastern foot of the Rocky mountains, the climate is milder than at sea level on the Atlantic coast in the same latitudes. At Fort Benton, on the upper Missouri, lat. $47^{\circ} 50'$, and 2,700 ft. above the sea, the mean is 10° warmer than at St. John's, Newfoundland, nearly in the same latitude. At Fort Laramie, 4,500 ft. above the sea, it is warmer by 2° or 3° in the annual mean than at Boston, nearly in the same latitude. Denver, at 6,000 ft. above the sea, is as warm as Baltimore, which is in the same latitude. These are representative positions for a large mass of interior surface, on which the climate is in marked contrast with the usual standards for like elevations, and where also the special modifying influences of the Pacific do not reach. A like anomaly exists on the great plateaus of central Asia, which has been noticed by Humboldt, and was recognized by him as establishing a new form of continental influence, or that of increased heat due to the presence of great elevated areas. Again, of new and striking developments in the climates of the western coast of North America, there are illustrations in the abrupt contrasts of the immediate coast of the Pacific with the interior, especially in summer. The peculiar cold winds of that coast in summer are met with off the coast before reaching the 30th parallel, and they are severe and almost violent from lat. 35° to 45° N., or almost to the mouth of the Columbia. They are due, as has been stated, to the vast mass of cold water moving from the northwest as a deep-sea current, and rising to the surface on the immediate coast. The highly heated plains and basins of the interior cause great rarefaction of the air in those basins, toward which the colder mass of the coast is drawn with force during the day, to subside in calm at night when radiation has cooled the temperature and restored the equilibrium. Further north the sea is warmer, both positively and relatively, and no contrast exists with the temperature of the land. The summer is very warm, and the climate most prolific in both animal and vegetable life over all Alaska and the broad valley of the Yukon, to lat. 65° or 68° N. Here again are marked contrasts of the Yukon and Mackenzie river valleys with the great plains eastward to Hudson bay. On this tract, and still more eastward and northward of this bay, the maximum of continental refrigeration exists, and a summer is scarcely known. The extreme severity of the climate of this district, down to the lower border of Labrador, is in marked contrast with the cli-

mate of like areas of Asia, rendering it less capable of occupation than any other area of the earth's surface. At Fort Hope, Repulse bay, there are but two months, July and August, in which the mean temperature is above freezing; while at Yakutsk, East Siberia, in nearly the same latitude, there are five months with the mean above freezing, and the summer mean is 58.5° , compared with 39.7° at Repulse bay. —In the northeast of Ireland, says Humboldt, lying under the same parallel of latitude as Königsberg in Prussia, the myrtle blooms as luxuriantly as in Portugal. The mean temperature of the month of August, which in Hungary rises to 70° , scarcely reaches 61° at Dublin, which is situated in the isothermal line of 49° ; the mean winter temperature, which falls to about 28° at Pesth, is 40° in Dublin (whose mean annual temperature is not more than 49°), 3.6° higher than that of Milan, Pavia, Padua, and the whole of Lombardy, where the mean annual temperature is upward of 55° . At Stromness in the Orkneys, scarcely half a degree further south than Stockholm, the winter temperature is 39° , and consequently higher than that of Paris, and nearly as high as that of London. Even in the Faroe islands, at latitude 62° , the inland waters never freeze, owing to the favorable influence of the west winds and of the sea. On the charming coast of Devonshire, near Salcombe bay, which has been termed on account of the mildness of its climate the Montpellier of the north, the *agave Americana* has been seen to blossom in the open air, while orange trees trained against espaliers, and only slightly protected by matting, are found to bear fruit. There, as well as at Penzance and Gosport, and at Cherbourg on the coast of Normandy, the mean winter temperature exceeds 42° , falling short by only 2.4° of the mean winter temperature of Montpellier and Florence. In comparison with the western coast of Europe, it is believed that the western coast of America is somewhat colder, although more equable than the eastern part of the western continent.—A. Keith Johnston says: "The climates of the Asiatic coast correspond with those of America along the Atlantic; and those of Columbia, Vancouver, and Washington are duplicates of those of western Europe and the British islands. The climate of California resembles that of Spain; the sandy plains and rainless region of Lower California reminding one of Africa with its deserts between the same parallels." "The elastic atmosphere and bracing effect of the Pacific climates," says Blodget, "constitute a striking difference from those of the eastern states. All residents concur in pronouncing it more favorable to physical and mental activity than any they have known." ("Climatology of the United States," p. 200.) According to observations made at West Point, N. Y., and Fort Trumbull, Conn., both in lat. $41^{\circ} 22'$, and but $1\frac{1}{2}^{\circ}$ of longitude apart, the winters are 4.67° milder and the summers 1° cooler at

Fort Trumbull than at West Point, the former being upon the sea, and the latter inland. This difference is still more manifest in that portion of the North American continent lying north of the boundary line of the United States. In Nova Scotia, which is nearly surrounded by water, the thermometer seldom indicates a temperature higher than 88° in summer, nor more than 8° below zero in winter; but in Canada, occupying the same parallels of latitude, the thermometer in summer rises as high as 97° , and occasionally 100° , while in winter a cold of 30° below zero is frequent, and the usual range of the temperature during the winter months is from 8° to 30° below zero.—Elevation above the level of the sea exercises a decided influence on climate. The temperature of the atmosphere is found to decrease in successive and regular gradation as it leaves the sea's level, so that in the ascent of lofty mountains within the tropics the traveller experiences every change of weather, from the oppressive heat of the summer's sun on the plain below, to the piercing cold of eternal frost on the lofty summit above. The region of perpetual spring in the neighborhood of Potosí, in South America, is remembered with emotions of delight by every traveller who has ascended that ridge of the Andes. The declension of temperature has been found, with occasional variations, to equal 1° for every 300 ft. in temperate climates. This subsidence of temperature with elevation is doubtless dependent on the extreme rarity of the atmosphere at a distance from the earth, and the consequent facility with which it is permeated by heat, as well as the radiating power possessed by the earth, which enables it to return to the contiguous atmosphere a portion of the solar rays it had previously absorbed. The atmosphere is condensed in proportion to the force with which it is compressed, and expands in exact ratio to the diminution of that force. It follows that, the superincumbent strata of air being compressed with greater force in its most dependent part, and that dependent part being nearest the earth's surface, its density will be there greatest, and this density will diminish in exact proportion to the ascent of the column of air. Now the atmosphere when under a certain compression has a certain capacity for latent heat, which is increased by a diminution of the compression, and diminished by its increase. If a column of air at a certain distance from the earth receive a certain number of the sun's rays, and then be brought suddenly down to occupy a denser medium, its particles becoming compressed, a portion of the latent heat becomes sensible and is given off to surrounding bodies. The following observations, made by Mr. Green during an aerial voyage, exhibit this declension of temperature. The thermometer at the earth's surface indicated a temperature of 74° ; at an elevation of 2,952 ft., 72° ; at 7,288 ft., 70° ; at 9,993 ft., 69° ; at 11,059 ft., 45° ; at 11,293

ft., 38° ; making a difference of 36° between the earth's surface and the highest altitude attained, or about 1° for every 311 ft. Sir John Leslie and Humboldt believe that the diminution is much more marked near the surface of the earth than is here indicated. Mr. Glaisher, in his midday ascents, found an average fall in temperature of 1° in 223 ft. for the first 1,000 ft. with a cloudy sky, and in 162 ft. with a clear one; while above 10,000 ft. the decline was 1° in 455 and 417 ft. respectively, and above 20,000 ft. it was only 1° in nearly 1,000 ft. under both conditions. (See *AERONAUTICS*.) But this reduction does not apply to elevation of large areas of surface above the level of the sea. It is only applicable to actual distances from the surface, or elevations in the atmosphere itself from any general surface.—Moisture exercises very marked influence over climate. Taken as a whole, all the gentle slopes on the American continent descend eastwardly toward the Atlantic, while the abrupt ones rise on its western aspect. In this respect there is a manifest difference between this continent and that of Europe, which gradually declines westwardly toward the Atlantic. This general configuration necessarily gives to Europe a moister as well as a more temperate climate than that of America in the same parallels of latitude. This would be much more obvious were it not for the admirable compensation made by the Gulf stream and the trade wind that accompanies it. From this source not only the Atlantic coast, but the Mississippi valley, which is exposed on the south to the gulf of Mexico, derives a large proportion of its moisture. (See *METEOROLOGY*.)

CLIMBING PERCH. See *ANABAS SCANDENS*.

CLINCH, a S. E. county of Georgia, bordering on Florida, bounded S. W. by the Suwannee river, which also intersects it, and W. by the Allapaha, and intersected by the Little Suwannee; area, 1,000 sq. m.; pop. in 1870, 3,945, of whom 507 were colored. The surface is level and swampy. The Atlantic and Gulf railroad passes through the county. The chief productions in 1870 were 41,605 bushels of Indian corn, 21,054 of oats, 22,589 of sweet potatoes, 330 bales of cotton, 153,325 lbs. of rice, and 1,060 of honey. There were 263 horses, 3,201 milch cows, 6,216 other cattle, and 7,753 swine. Capital, Magnolia.

CLINCH RIVER rises among the hills of S. W. Virginia, passes into Tennessee, flows through the valley between Clinch and Powell mountains, and unites with the Holston at Kingston, to form the Tennessee. Its length is estimated at about 200 m., for more than half of which it is navigable by small boats.

CLINGMAN, Thomas L., an American politician, born at Huntsville, N. C., about 1812. He graduated at Chapel Hill university in 1832; became shortly after a member of the state legislature, and in 1843 was elected to congress, remaining a member of the house of representatives, with the exception of a single term, till 1858, and becoming chairman of the com-

mittee on foreign affairs. He was originally a whig, but subsequently joined the democratic party. In 1858 he was appointed to the United States senate, to fill the vacancy occasioned by the resignation of Mr. Biggs, and in 1860 was elected senator for a full term. Upon the approach of the civil war he opposed measures looking to the use of force against the South. In May, 1861, he was sent as a commissioner to the confederate congress, to give assurances that North Carolina would coöperate with the Confederate States, and was invited to participate in the discussions of that body. In July he was expelled from the senate of the United States, and afterward served as a colonel in the confederate army. He made valuable contributions to the knowledge of the geology and mineralogy of North Carolina, especially as to its mountains, one of the highest peaks of which has received his name.

CLINIAS. I. The father of Alcibiades. He served with the greatest distinction against the Persians in the naval battle at Artemisium, 480 B. C., with 200 men on board a trireme which he had furnished at his own expense. He was slain at the battle of Coronæa in 447 B. C., when the Athenians were defeated by the Bæotian and Eubæan exiles. His younger son, also named Clinias, was according to Plato almost a madman. **II.** A Pythagorean philosopher of Tarentum, a friend of Plato. In obedience to the Pythagorean principle, he was accustomed to assuage his anger by playing upon the harp. When Porus of Cyrene had lost all his fortune through a political revolution, Clinias, who knew nothing of him except that he was a Pythagorean, went to Cyrene and supplied him with money to the full extent of his loss. He, with Amyclas, dissuaded Plato from burning the works of Democritus.

CLINOMETER (Gr. *κλίνειν*, to incline, and *μέτρον*, a measure), an instrument for measuring the angle made by any plane with the horizontal, and commonly used for determining the dip of beds of rock and the inclination of veins. It is made in various forms, as in that of a rule with a graduated arc upon the hinge to mark the angle of opening of the two arms. A spirit level attached to one arm serves to keep this in the horizontal plane, while the other is opened to coincide with the plane of the stratum of rock. Another convenient form is made by suspending a small metallic index upon the pivot of the needle of a pocket compass, which, by swinging freely, indicates the vertical line. The box is either square, or one side is furnished with a projecting limb, which forms a tangent to the circle at the zero point of the graduation. This tangent line being applied to a horizontal plane, the index marks zero; upon an inclined plane it marks the number of degrees this deviates from the horizontal.—In the French marine service, a clinometer is employed for determining the inclination of the keels of vessels at sea, in order to trim them for that draught of water fore and aft at which

they are known to sail best. The instrument adopted by the royal marine is that of M. Coincé, described in the *Dictionnaire du commerce et des marchandises* of M. Perpigna. It is made of two elongated glass bulbs, placed about 18 inches apart, and connected by a glass tube proceeding from their bases. Each bulb is half filled with mercury. From the upper extremity of each a tube proceeds, parallel with that at the base to within an inch of meeting, where they turn up in a vertical direction. To these vertical tubes is attached an index or vertical, which supports a scale of 2 degrees, divided into 120 minutes. Alcohol colored red is poured into the tubes until it fills them up to the point marked zero upon the scale. It rests upon the mercury, which transmits to the alcohol its oscillations. A bulb upon the summit of each of the tubes receives the alcohol when the violent movement of the ship causes it to flow over the open ends of the tubes. The angle of inclination being determined by the scale, and the length of the keel being known, the difference of draught at each extremity is easily calculated.

CLINTON, the name of nine counties in the United States. **I.** The N. E. county of New York, bordering on Lake Champlain, bounded N. by Canada and S. by the Ausable river; area, 952 sq. m.; pop. in 1870, 47,970. The surface near the lake is level, but becomes hilly and mountainous toward the western part of the county. Timber is abundant, and the soil is fertile. The mountains contain valuable mines of iron, the ore being abundant, and of superior quality. Dannemora is the seat of a state prison, which in 1871 had 529 inmates. The convicts are employed in digging, separating, and preparing iron ore for the neighboring furnaces. The county is traversed by the Vermont and Canada, the Montreal and Plattsburgh, and the Whitehall and Plattsburgh railroads. The chief productions in 1870 were 81,410 bushels of wheat, 106,256 of Indian corn, 520,609 of oats, 92,443 of buckwheat, 41,243 of peas and beans, 844,703 of potatoes, 66,470 tons of hay, 965,608 lbs. of butter, 151,525 of wool, and 163,036 of maple sugar. There were 7,883 horses, 10,972 milch cows, 10,740 other cattle, 40,391 sheep, and 4,466 swine; 5 manufactories of charcoal, 19 of starch, 4 of woollen goods, 15 of iron, 1 of nails and spikes, 8 grist mills, 14 tanneries, 3 planing mills, 63 saw mills, 3 manufactories of boots and shoes, 3 of carriages and wagons, 1 of cordage and twine, 5 of furniture, 6 of iron castings, 3 of machinery, 3 of perfumery and fancy soaps, 12 of saddlery and harness, 3 of sashes, doors, and blinds, and 9 leather-carrying establishments. Capital, Plattsburgh. **II.** A N. central county of Pennsylvania, traversed by the W. branch of the Susquehanna; pop. in 1870, 23,211. The former area was about 1,000 sq. m., but it has been somewhat diminished by taking a portion for Cameron county. The surface is mountainous, the Alleghany ridge extending

along the eastern border. It abounds in iron, coal, and timber. The county is traversed by the West Branch canal and the Philadelphia and Erie railroad, and the Bald Eagle division of the Pennsylvania Central. The chief productions in 1870 were 147,067 bushels of wheat, 458,716 of Indian corn, 209,813 of oats, 55,203 of potatoes, 11,442 tons of hay, 218,250 lbs. of butter, 17,149 of wool, and 36,169 of tobacco. There were 2,512 horses, 2,784 milch cows, 3,950 other cattle, 6,045 sheep, and 6,983 swine; 10 flour mills, 47 saw mills, 2 manufactories of sashes, doors, and blinds, 9 of carriages and wagons, 2 of edge tools, 7 of bricks, 7 of furniture, 2 of pig iron and blooms, 5 of iron castings, 2 of machinery, 1 planing mill, and 8 tanneries. Capital, Lock Haven. **III.** A S. county of Kentucky, bordering on Tennessee, bounded N. by the Cumberland river; area, about 350 sq. m.; pop. in 1870, 6,497, of whom 292 were colored. The surface is hilly, Poplar mountain in the E. part, 1,000 feet high, being the principal summit. The soil is fertile, though little improved. Coal and iron are abundant, and there is good water power. The chief productions in 1870 were 28,770 bushels of wheat, 198,602 of Indian corn, 37,881 of oats, 12,395 of Irish and 9,547 of sweet potatoes, 311 tons of hay, 70,821 lbs. of butter, 14,946 of wool, and 117,238 of tobacco. There were 1,626 horses, 1,534 milch cows, 2,547 other cattle, 6,741 sheep, and 9,800 swine. Capital, Albany. **IV.** A S. W. county of Ohio, area, 467 sq. m.; pop. in 1870, 21,914. It has an undulating surface and fertile soil. It is traversed by the Marietta and Cincinnati railroad, the Cincinnati and Muskingum Valley, and Hillsboro' branch. The chief productions in 1870 were 329,802 bushels of wheat, 158,997 of Indian corn, 109,238 of oats, 64,682 of potatoes, 23,400 of flax seed, 12,919 tons of hay, 348,150 lbs. of butter, 142,221 of wool, and 62,641 of maple sugar. There were 7,219 horses, 5,390 milch cows, 8,398 other cattle, 38,826 sheep, and 39,243 swine; 14 manufactories of carriages and wagons, 9 of saddlery and harness, 2 of woollen goods, 15 of bricks, and 15 flour mills. Capital, Wilmington. **V.** A S. central county of Michigan, drained by Grand, Maple, and Looking-glass rivers; area, 576 sq. m.; pop. in 1870, 22,845. The surface is flat, and there are extensive forests. The soil is fertile. The Detroit, Lansing, and Lake Michigan railroad intersects the S. W. corner, the Jackson, Lansing, and Saginaw railroad the S. E. corner, and the Detroit and Milwaukee railroad traverses the county. The chief productions in 1870 were 497,030 bushels of wheat, 274,606 of Indian corn, 285,419 of oats, 227,140 of potatoes, 20,369 tons of hay, 796,970 lbs. of butter, 196,444 of wool, and 39,151 of hops. There were 5,313 horses, 6,620 milch cows, 9,935 other cattle, 44,895 sheep, and 10,151 swine; 8 flour mills, 18 saw mills, 6 manufactories of agricultural implements, 9 of carriages and wagons, 6 of tin, copper, and

sheet-iron ware, 1 of woodenware, and 3 planing mills. Capital, De Witt. **VI.** A central county of Indiana; area, about 432 sq. m.; pop. in 1870, 17,330. The surface is level and the soil fertile. With the exception of a few prairies, the largest of which is 12 m. long and 4 m. wide, it is covered by dense forests. The Indianapolis, Cincinnati, and Lafayette railroad intersects the S. W. corner. The chief productions in 1870 were 535,354 bushels of wheat, 980,891 of Indian corn, 140,389 of oats, 53,270 of potatoes, 6,392 of flax seed, 10,767 tons of hay, 502,253 lbs. of butter, 87,861 of wool, and 24,300 gallons of sorghum molasses. There were 7,763 horses, 5,890 milch cows, 7,377 other cattle, 25,537 sheep, and 28,542 swine; 10 flour mills, 35 saw mills, 2 manufactories of boots and shoes, 17 of carriages and wagons, 7 of furniture, and 5 of saddlery and harness. Capital, Frankfort. **VII.** A S. W. county of Illinois; area, 420 sq. m.; pop. in 1870, 16,285. Kaskaskia river, Shoal, Beaver, and Crooked creeks are the principal streams. The surface consists mainly of fertile prairies interspersed with tracts of forest. The Ohio and Mississippi railroad passes through the county, and the Illinois Central railroad touches the S. E. corner. The chief productions in 1870 were 611,388 bushels of wheat, 813,257 of Indian corn, 446,324 of oats, 76,297 of potatoes, 11,585 tons of hay, and 169,055 lbs. of butter. There were 5,903 horses, 3,739 milch cows, 4,114 other cattle, 5,358 sheep, and 17,911 swine; 3 manufactories of furniture, 12 of carriages and wagons, and 10 grist mills. Capital, Carlyle. **VIII.** An E. county of Iowa, bordering on Illinois, bounded E. by the Mississippi, and S. by the Wapipinicon river, which intersects the S. W. corner; area, 696 sq. m.; pop. in 1870, 35,357. Prairies and forests are scattered over the surface, and the soil is generally productive. Peat is found. The Chicago and Northwestern railroad passes through it. The chief productions in 1870 were 954,175 bushels of wheat, 2,493,660 of Indian corn, 912,469 of oats, 199,072 of barley, 231,348 of potatoes, 16,170 of flax seed, 52,706 tons of hay, 989,896 lbs. of butter, and 44,269 of wool. There were 14,520 horses, 13,564 milch cows, 20,120 other cattle, 9,633 sheep, and 39,485 swine; 11 flour mills, 8 saw mills, 10 manufactories of carriages and wagons, 4 of furniture, 3 of iron castings, 3 of machinery, 1 of matches, 1 of paper, 2 of sashes, doors, and blinds, 1 distillery, and 5 breweries. Capital, De Witt. **IX.** A N. W. county of Missouri; area, 460 sq. m.; pop. in 1870, 14,063, of whom 683 were colored. The surface is chiefly prairie, in some places well wooded. Sandstone and limestone underlie the soil, which is generally fertile. The Hannibal and St. Joseph railroad skirts the N. border, and its Cameron and Kansas City branch, and the Lexington and St. Joseph branch of the western division of the North Missouri railroad pass through it. The chief productions in 1870

were 93,770 bushels of wheat, 1,147,395 of Indian corn, 239,598 of oats, 62,759 of potatoes, 7,382 tons of hay, 200,688 lbs. of butter, and 44,714 of wool. There were 6,095 horses, 1,504 mules and asses, 4,224 milch cows, 9,433 other cattle, 14,096 sheep, and 25,921 swine; 5 manufactories of carriages and wagons, 6 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 2 wool-carding and cloth-dressing establishments, 4 saw mills, and 6 flour mills. Capital, Plattsburgh.

CLINTON, a city of Clinton co., Iowa, on the Mississippi, about 42 m. above Davenport; pop. in 1870, 6,129. The river is here crossed by an iron drawbridge, 4,100 ft. long, which cost \$600,000. The Chicago and Northwestern railroad has here its repair shops, and there is a large number of saw mills, one of which is capable of producing 200,000 ft. of lumber a day. There is a national bank, and a tri-weekly and three weekly newspapers, of which one is in German. In 1871 there were 26 public schools, with 28 teachers and 1,331 pupils.

CLINTON, the name of several towns and villages in the United States. **I.** A town of Worcester co., Mass., on Nashua river, 32 m. W. of Boston; pop. in 1870, 5,429. It is a thriving manufacturing place, and contains a number of large mills and factories, supplied with water power by the Nashua river. The principal establishments are 2 cotton mills, with 24,612 spindles, manufacturing 4,353,362 yards of ginghams annually, and employing 340 males and 560 females, capital \$840,000; 1 woollen carpet mill, with 3 sets of machinery, manufacturing 364,300 yards of carpeting, and employing 161 males and 172 females, capital \$500,000; 1 manufactory of hollow ware and castings, capital \$10,000; 1 of cotton, woollen, and other machinery, capital \$20,000; 3 of combs, capital \$10,200; 1 of wire cloth, capital \$100,000; and 1 of hoop-skirt material, capital \$12,000. There are employed in the manufacture of boots and shoes 58 males and 25 females; value of product, \$121,500. The Lancaster or gingham mills are thought to be the most complete of the kind in the United States. The buildings occupy four acres of ground on the bank of the stream; this company also manufactures counterpanes; it has a dye house, said to be the best in the world. The Bigelow carpet company produces superior Brussels carpeting. There are several handsome churches, good schools, and a weekly newspaper. The Boston, Clinton, and Fitchburg, and the Worcester and Nashua railroads pass through the town. **II.** A post village of Kirkland township, Oneida co., N. Y., built on both sides of Oriskany creek, and on the Chenango canal, 7 m. S. W. of Utica; pop. in 1870, 1,640. It is the seat of Hamilton college, and contains several churches. (See HAMILTON COLLEGE.) A weekly paper and a monthly periodical are published here. The Utica, Clinton, and Binghamton railroad passes through it. **III.** A borough and township of Hunterdon co., N. J., 31 m.

N. W. of Trenton; pop. of the township in 1870, 3,134; of the borough, 785. It is situated on the south branch of Raritan river, and contains several mills and factories. The surrounding country is very productive and highly cultivated, and is noted for its limestone quarries. A weekly newspaper is published here. The New Jersey Central railroad passes through it. **IV.** A post village and the capital of E. Feliciana parish, La., 85 m. N. W. of New Orleans; pop. in 1870, 930, of whom 297 were colored. Two weekly newspapers are published. A railroad connects it with Port Hudson.

CLINTON, Charles, the ancestor of the Clintons in New York, born in the county of Longford, Ireland, in 1690, died in what is now Orange co., N. Y., Nov. 19, 1773. His grandfather was an adherent of Charles I., and after the defeat of the royalists fled for refuge to the north of Ireland; and his mother was daughter of a captain in the parliamentary army. Having determined with a number of his friends to emigrate to America, he chartered a ship, and sailed for Philadelphia, May 20, 1729. After a passage marked by the attempt of the captain to starve the passengers in order to possess their property, and in which after the death of several, among whom were a son and daughter of Mr. Clinton, it was proposed, but not attempted, to wrest the command from the captain, he was landed with his companions, Oct. 4, at Cape Cod. The place for a permanent settlement was selected in the spring of 1731 in Ulster co., N. Y., about 6 m. W. of the Hudson river, and 60 m. N. of New York city. Mr. Clinton was chiefly occupied as a farmer and land surveyor, but was also judge of the county court, and in 1756 was appointed lieutenant colonel, and served with two of his sons in the expedition against Fort Frontenac.

CLINTON, De Witt, an American statesman, grandson of the preceding, and son of James Clinton and Mary De Witt, born at Little Britain, New Windsor, Orange co., N. Y., March 2, 1769, died in Albany, Feb. 11, 1828. His descent on the father's side was from English ancestors long domiciled in Ireland, and on the mother's side he was of Dutch and French extraction. His education was begun in a grammar school near his home, continued at the academy in Kingston, and completed at Columbia college, where he bore away the college honors in 1786. He immediately engaged in the study of the law under the instruction of Samuel Jones in the city of New York, and was admitted to the bar in 1788. His ardent temper and earnest ambition carried him at once into the political field, and his sentiments, sympathies, and affections determined his position under the banner of his kinsman George Clinton, the chief within the state of the republican party. While the question of the adoption of the federal constitution was yet a subject of popular discussion, he proved his zeal and controversial power by writing a series of letters signed "A Countryman," in

reply to the "Federalist." He attended the state convention which adopted the constitution, and reported its interesting debates for the press; and forsaking his profession, he became the private secretary of George Clinton, then governor of New York. In this position he maintained the cause of his kinsman and that of the republicans by such a vigorous use of the press, that he immediately came to be regarded as its leading and most prominent champion. About this time he was appointed one of the secretaries of the newly organized board of regents of the university, and secretary of the board of commissioners of fortifications of the state. On the retirement of George Clinton in 1795, and the accession of Mr. Jay to the chair of state, De Witt Clinton relinquished his offices, but did not relax his championship of the republican cause in opposition to the administration of Mr. Jay in the state and to that of John Adams at Washington. With all his vehemence of partisan feeling, he nevertheless adhered to the line of patriotic conduct he had early marked out for himself. Thus, while assailing the administration of Mr. Adams and the federalists for their alleged hostility toward France, he raised, equipped, commanded, and disciplined an artillery company which was held in readiness for the defence of the country in the event of the occurrence of war with France, then so generally anticipated. Besides these occupations, he applied himself diligently to the studies of natural philosophy, natural history, and other sciences. In 1797 he was sent to the assembly, the lower house of the legislature of New York, by the city of New York, and in the next year was elected to the senate of the state for a term of four years. The republican party, triumphing in the Union in 1800, carried also a majority in the state of New York, although John Jay still remained in office. Official patronage in the state was committed by its first constitution to the governor, together with a council consisting of one senator from each district, chosen by a vote of the house of assembly. The governor presided in the council, and habitually exercised exclusively the right of nomination, leaving only to the council the power to confirm or reject. During the administration of George Clinton his opponents, when in a majority in the council, had claimed for each member a right of nomination coördinate with that of the governor; but the pretension was disallowed by Gov. Clinton, and the original practice remained. De Witt Clinton in 1801 became a member of the council, backed by a republican majority. He now challenged the right of nomination for himself and his associates. The governor denied it, and adjourned the council, and never afterward reconvened it. He submitted the subject to the legislature, and appealed to that body for a declaratory law. Clinton vigorously defended the position assumed by him in the council. The legislature referred the matter to a convention of the people. The republican party predomi-

nated in that body, and the constitution was amended so as to effect the object at which Clinton had aimed. It was a season of apprehended invasion; Clinton was active and efficient in securing the means of public defence. The public health was continually threatened by the approach of contagious pestilence; he was unremitting and judicious in providing the necessary sanitary laws and institutions. He urged improvement of the laws in favor of agriculture, manufactures, and the arts, labored to stimulate the great and finally successful effort of the time to bring steam into use as an agent of navigation, and employed all his talents and influence in meliorating the evils of imprisonment for debt, and in abolishing slavery. At the early age of 33 his term of brilliant service in the senate of the state was crowned by his appointment to a seat in the senate of the United States. He remained in that body through two of its annual sessions. The period, though short, sufficed to enable him to impress upon the country a conviction of his great ability, and to enlarge the sphere of his already eminent reputation. His principal achievement there was an elaborate, exhaustive, and impressive speech in favor of moderation on the occasion of a high popular excitement against Spain, resulting from her violation of treaty stipulations for commercial privileges to the citizens of the United States on the banks of the Mississippi, the territory of Louisiana not yet having been acquired by the United States. Clinton resigned his place in the senate to assume the office of mayor of the city of New York, under an appointment made by George Clinton (again governor) and a republican council of appointment in 1803. He remained undisturbed in the mayoralty from 1803 to 1807, when he was removed. He was reappointed in 1809, displaced in 1810, restored in 1811, and thenceforward continued therein till 1815. Within this period of nearly 12 years he was also a member of the senate of the state from 1805 to 1811, and lieutenant governor from 1811 to 1813; and during a portion of the time he also held a seat in the council of appointment. In 1804 George Clinton, who had been known as an aspirant to the presidency for many years, was elected vice president of the United States, and soon after, by reason of his advanced years, ceased to be conspicuous. De Witt Clinton, by an easy transition, rose to the same eminent consideration, and came to be regarded as the foremost candidate of the republican party within the state of New York for the presidency. Not at all abating either his personal activity or his proscriptive severity toward others, he encountered at their hands hostility and retaliation, fierce, violent, and apparently relentless. A dangerous rival disappeared when Aaron Burr sank under the odium of intrigues against Jefferson in the election of 1800, and the still greater odium of the fatal duel with Hamilton in 1804; but Clinton was

successively brought into an attitude of distrust toward Lewis and Tompkins, the successors of George Clinton in the office of governor. He hesitated to approve the system of commercial restrictions adopted by President Jefferson, and questioned the wisdom of the course of Madison immediately previous to the declaration of war against Great Britain. It is beyond all doubt now that Clinton was eminently brave, and that he loved his country with a devotion that knew no hesitation when her safety or welfare required sacrifice at his hands. But there was at that time a portion of the federal party which condemned the measures of the government so severely that their own loyalty to the country was not unnaturally questioned, and their conduct, whatever were their motives, had a tendency to encourage the public enemy, and so to embarrass the administration. This brought suspicion on the whole federal party, although as a mass it was loyal and patriotic, and it suited the purposes of Clinton's opponents to impute his hesitation and reserve to the influence of sympathies with the federalists. Day by day, therefore, old republican associates and followers separated from him, and in their places federalists, who saw that there was no longer any hope of effectually serving their country under their own dilapidated organization, and who believed him as patriotic as the statesmen who were in power, and much wiser than they, lent him indirectly their sympathy and cautious support. It was in this unlucky conjuncture that Clinton, whose aspirations to the presidency had long been known, concluded that the time had arrived when they ought to be and could be realized. Madison's first term was to expire in 1813, and his successor was to be elected in 1812. The republican caucus at Washington disallowed Clinton's pretensions, and renominated Madison. Clinton still retained the confidence of the republican party in his own state as an organized political force, though it was sadly demoralized. He received a nomination at the hands of the republican members of the legislature. The federalists made no nomination, and indirectly gave him their support. He received 89 electoral votes, while Madison received 128, and thus was re-elected. This defeat was disastrous to Clinton. The republican party of the state of New York shrank from his side, and at the first opportunity in 1813 displaced him from his office of lieutenant governor, leaving him only the mayoralty of the city of New York. But in fact he had changed not his principles, policies, or sympathies, but only his personal relations. He had attempted to gain the presidency, not to overthrow the republican party, but to re-establish it, as he thought, on a better foundation; not to favor the public enemy, but to prosecute the war against him, as he thought, with greater vigor and effect. The result was a complexity of relations that seemed to render all further ambition hopeless. He was a re-

publican disowned by his party; and though not a federalist, was held responsible for the offences imputed to that party, without having their confidence, or even enjoying their sympathy. His fall seemed irretrievable. Nevertheless, he had been fortunate during the period which we have been reviewing in laying broad and deep the foundations of a popularity that at no distant day might be made to maintain a personal party, which would long perplex and often confound the adversaries who now exulted over what was thought his final ruin. The city of New York had now begun to feel the beneficial influence of the centralization of commerce under the operation of the federal constitution, and public spirit was profoundly awakened. The deficiencies of its municipal laws, of its defences, of its scientific and literary institutions, of its institutions of art, and the absence of most of the elements of a metropolitan character, were generally felt and confessed. Enlightened, liberal, and active men were moving in a hundred ways to make the city worthy of its high but newly discovered destiny. Only some lofty, genial, and comprehensive mind was wanted to give steadiness and direction to these movements. De Witt Clinton supplied this want. He associated himself with citizens who engaged in the establishment of schools designed to afford the advantages of universal primary education; with others who founded institutions for the study of history, for improvement in art, for melioration of criminal laws, for the encouragement of agriculture, for the establishment of manufactures, for the relief of all forms of suffering, for the correction of vice, for the improvement of morals, and for the advancement of religion. In all these associations he subjugated his ambition, and seemed not a leader but a follower of those who by their exclusive devotion were entitled to precedence. They derived from him, however, not only liberal contributions by his pen, by his speech, and from his purse, but also the aid of his already wide and potent influence, and the sanctions of his official station and character. He carried the same liberal and humane spirit into his administration as chief magistrate of the city. By virtue of that office, he was not only the head of the police, charged with the responsibilities of preserving order and guarding the city from external dangers, but he was at once a member and president of the municipal council, of the board of health, of the court of common pleas, and of the criminal court. He appeared in all these various characters always firm, dignified, intelligent, and prepared for every exigency; the friend of the poor, the defender of the exile, the guardian of the public health, the scourge of disorder, the avenger of crime, the advocate of civil and religious liberty, and the patron of knowledge and virtue. As a member of the senate of the state and lieutenant governor, he exercised the functions not only of a legislator, but also of a judge of the court of last resort;

and amid all the intrigues and distractions of party he bore himself in those high places with the dignity, and exercised the spirit, of a sagacious, far-seeing, and benevolent statesman. Especially he arrested the popular prejudice against himself in regard to his loyalty, by the utmost liberality and efficiency both as mayor and legislator in securing adequate means for public defence, by providing loans to the government, by voting supplies of materials and men, and by soliciting the military command to which his admitted courage, talent, and influence seemed to entitle him. But beyond all this, he adopted early and supported ably and efficiently the policy of the construction of canals from Lake Erie and Lake Champlain to the tide water of the Hudson, and showed to his fellow citizens, with what seemed a spirit of prophecy, the benefits which would result from those works to the city, the state, and the whole country, in regard to defence, to commerce, to increase of wealth and population, and to the stability of the Union. He was so successful in this that he was deputed, with others, in the year 1812, by the legislature of the state, to submit that great project to the federal government at Washington, and solicit its adoption or patronage of the policy as a national measure. That government, happily for the state, and fortunately for him, declined, and the occurrence of the war of 1812 put the subject to rest, to be revived at a more propitious season. The intellectual vigor, the impartial spirit, and the energetic resolution which Clinton displayed in these various duties, awakened profound and general admiration; while the manifest beneficence of his system excited enthusiastic desires for material and moral progress. He had thus become identified even in the darkest hour of his political day with the hopes and ambition of his native state, and with the hopes and ambitions of all the other states which waited to be benefited directly by her movement, or to emulate her example. By a system chosen and perfected by himself, and exclusively his own, he had gained a moral position similar and equal to that which Hamilton had won before him when, the tide of popular favor having deserted him, and left him destitute of power and influence, he still stood forth an isolated figure, attracting an admiration and exciting an interest which his successful rivals feared to contemplate. But it was not for Clinton to reascend the political ladder until he had released his hold on the lowest step, and had once more touched the ground. His opponents made haste to dislodge him from that last foothold. In January, 1815, he was removed from the mayoralty by a council of appointment in the interest of the republican party. Fortune had gone with greatness, and he sunk into private life without even the means of respectable subsistence. The severity of this proscription, coupled with the greatness of his fall, as well as of his character, awakened regrets and sympathies among large

classes who did not stop to consider how rashly he had tempted fortune, or how ruthlessly he had wielded the axe against those who had now precipitated him to the ground. In the autumn of that year, and in the obscurity of a retreat to the country, he prepared an argument in favor of the immediate construction of the Erie and Champlain canals. Never has there appeared, in this or perhaps in any other country, a state paper at once so vigorous, so genial, so comprehensive, and so conclusive. It was couched in the form of a memorial from the citizens of New York to the legislature of the state, and was deferentially submitted to a public meeting for their adoption. The city adopted the memorial, and appealed to the citizens of the interior portions of the state. They responded with enthusiasm; other states and territories lent their approving voices. The policy was from that moment certain of success. It was hindered only by the political prejudices which hung around its advocate. His opponents called these prejudices into new activity. With short-sighted malice, they affected to consider the attractive scheme as not merely a new resort of a ruined politician, but as one original with and devised by himself, impracticable, absurd, and visionary, although for more than a hundred years sagacious and enlightened statesmen connected with the affairs of the colony and of the state of New York had, with various degrees of distinctness, indicated and commended the obnoxious policy, and the state itself had at an early day made demonstrations toward its adoption, and had recommended the whole enterprise before the war to the adoption of the federal government. Clinton, if left to designate for his adversaries their mode of opposition, could have preferred no other. It presented him as not merely the advocate, but even the inventor of the system whose prospective benefits were already triumphantly demonstrated. He appeared at Albany, at the assembling of the legislature, to commend it. The governor, the organ of the republican party, was silent on the subject. The republican legislature rendered it just enough of favor to encourage and strengthen Clinton, and too little to make it their own and separate him as a necessary agent from it. It appointed him with others a commissioner to make the necessary surveys and estimates, solicit grants and donations, and report at the next session. A vacancy in the office of governor was now to occur by the transfer of the esteemed and popular Tompkins, the chief republican character in the state, to the post of vice president of the United States at Washington. Spontaneous demonstrations presented Clinton before the public as a candidate; the party machinery refused to work in the hands of his adversaries, and he was elected in the summer of 1816 to the office of governor, practically by the unanimous voice of the people. It seemed for a short time as if all partisan or-

ganization had been permanently broken up, and as if party spirit had been extinguished for ever. Notwithstanding all these pleasing auguries, the period of his administration was filled up, like former ones, with violent and embittered political controversies. He triumphed in 1819, being reelected, though by a very small majority, over Daniel D. Tompkins, who, while yet vice president, became the opposing candidate, and brought into the canvass a popularity never before overbalanced. His adversaries availed themselves of just complaints against the constitution to move the call of a convention for its amendment, and the measure was eminently popular. Clinton hesitated so long as to become identified with the opposition to it. The convention made reforms which diminished the power of the executive and judiciary, and conceded an enlargement of the right of suffrage, with other popular rights, while it adopted his canal policy. Clinton wisely declined to be a candidate under such circumstances for a reelection as governor, and Joseph C. Yates was called to the office with a unanimity equal to that which had attended Clinton's elevation to the same place. Faction, however, disorganized the triumphant party in 1824. At the same time the legislature in its interest abused its triumph over Clinton by removing him without notice and without cause from the now obscure office of canal commissioner, in which he was serving, as he had served from the first, only as an adviser and without any compensation. Indignation awakened by this injustice, and combined with popular discontents resulting from other causes, bore him at the end of the same year back into the office of governor by a very decided vote; but the new combination which had secured this result was committed to the support of John Quincy Adams in the federal government, while Clinton's sympathies or his views of duty or of interest determined his inclination toward, first, William H. Crawford, and then Andrew Jackson, as candidates for the presidency. He was thus once more in his old position, sustained by a party from whom he withheld his confidence and sympathy, and opposed by the one to which he looked for ultimate support. He was barely reelected in 1826, while the legislature was opposed to him. His administration of the state government, however, which continued throughout a period of 12 years, with the exception of an intervening period of two years, was one of unequalled dignity and energy. He had the good fortune to mature the system of finance which enabled the state, unconscious of expense or care, to begin and carry out his policy of internal improvement, and to break with his own hand the ground in the beginning of the enterprise, on July 4, 1817; and overcoming constant, unremitting, and factious resistance, he had the felicity of being borne, in October, 1825, in a barge on the artificial river which he seemed to all to have constructed, connecting

Lake Erie with the bay of New York, while bells were rung and cannons saluted him at every stage of that imposing progress. No sooner had that great work been undertaken in 1817, than the population of the state began to swell with augmentation from other states and from abroad; prosperity became universal; old towns and cities expanded, new ones rose and multiplied; agriculture, manufactures, and commerce were quickened in their movements, and wealth flowed in upon the state from all directions. He inaugurated the construction of branches of the Erie canal, by which it was ultimately connected with the internal lakes, with Lake Ontario, and with the Susquehanna, the Alleghany, and the St. Lawrence rivers; and by his counsel and advice, now sought in all directions, he hastened the opening of those canals in New Jersey, Pennsylvania, Ohio, Indiana, and Illinois, which, in connection with those of New York and with natural channels, now constitute a system adequate to the internal commerce of an empire. De Witt Clinton, witnessing the enjoyment of the continually enlarging realization by the public of the benefits of his labors, died at Albany, the seat of his authority and the chief theatre of his active life. It scarcely needs to be added that party spirit was hushed into profound silence; that a grateful people mourned his death with all the pomp of national sorrow; and that posterity cherishes his memory with the homage deserved by a benefactor of mankind. While yet young Mr. Clinton married Maria Franklin, who brought him a liberal fortune, and who died in 1818. In the succeeding year he was married to Catharine Jones, who survived him. He had a commanding stature, highly intellectual features, and a graceful form, set off with severe and dignified manners. He combined in a rare degree vigor, versatility, and comprehensiveness of mind, with untiring perseverance in the exercise of a lofty and unconcealed ambition.—He published "Discourse before the New York Historical Society" (1812), "Memoir on the Antiquities of Western New York" (1818), "Letters on the Natural History and Internal Resources of New York" (1822), "Speeches to the Legislature" (1823), and several literary and historical addresses. See Hosack, "Memoir of De Witt Clinton" (1829); Renwick, "Life of De Witt Clinton" (1840); Campbell, "Life and Writings of De Witt Clinton" (1849); and "National Portrait Gallery of Distinguished Americans," vol. ii.

CLINTON, George, an American soldier and statesman, youngest son of Charles Clinton, born in Ulster co., N. Y., July 26, 1739, died at Washington, April 20, 1812. He received a careful education, directed chiefly by his father and by a Scottish clergyman who was a graduate of the university of Aberdeen, and he early signalized his enterprising character by sailing in a privateer in the French war.

He soon after joined a militia company as lieutenant, and took part in the expedition against Fort Frontenac, now Kingston, Canada. Choosing the legal profession, he practised with distinction in his native county, till in 1768 he was elected to the colonial assembly, where he soon became the head of a whig minority. He was elected to the continental congress in 1775, voted for the declaration of independence, was appointed brigadier general of the United States in 1777, and in the same year, at the first election under the constitution of New York, was chosen both governor and lieutenant governor of the state. He accepted the governorship, and by six successive elections held that office for 18 years. Both in his civil and military capacity, he exhibited great energy and rendered important services throughout the war; and though his efforts to save Forts Montgomery and Clinton in the Hudson highlands in 1777 were unsuccessful, it was yet due in a large measure to his counsels that communication was prevented between the British in Canada and the city of New York. The politics of New York were in a distracted state by reason of the numerous tories residing within its limits, which made the chief magistracy unsurpassed in difficulty by any office in the country except that of commander-in-chief of the army. In 1788 he presided over the convention at Poughkeepsie to consider the federal constitution, the adoption of which he opposed, not deeming it sufficiently decided in favor of the sovereignty of each state. When in 1792 Washington was elected to the presidency for the second time, Clinton received 50 electoral votes for vice president. After an interval in his official life, he was again elected in 1801 governor of New York, and in 1804 was elected vice president of the United States, receiving the same number of votes as Jefferson received for the presidency. He was one of the prominent candidates for nomination to the presidency in 1808, and received 6 electoral votes in opposition to Madison, but he was continued in the chair of vice president by 113 electoral votes. He was acting in discharge of the duties of his office at the time of his death. By his casting vote in the senate, Jan. 24, 1811, the recharter of the national bank was refused; he thinking it inexpedient rather than unconstitutional.

CLINTON, Sir Henry, an English soldier, born about 1738, died at Gibraltar in December, 1795. He was the grandson of Francis Fiennes Clinton, sixth earl of Lincoln, became a captain in the guards in 1758, served in the seven years' war, and was sent to America as major general in 1775. He took a prominent part in the battle of Bunker hill, and in the battle on Long Island which resulted in the evacuation of New York by the Americans; stormed Fort Clinton on the Hudson in 1777, in a vain effort to relieve Burgoyne; and was appointed commander-in-chief of the British land forces in America in January, 1778, superseding Gen.

Howe. After being forced by Washington to evacuate Philadelphia, he sent an expedition against Savannah in 1779, and led an army against South Carolina, capturing Charleston. In May, 1780, he entered into negotiations with Arnold; and he sailed from New York with 7,000 men to relieve Cornwallis on the very day that the latter capitulated. He was superseded by Sir Guy Carleton in 1781, returned to England in 1782, and died soon after he had been appointed governor of Gibraltar. He wrote a narrative of his conduct in America, a rejoinder to Lord Cornwallis's observations on it (1783), and "Observations on Stedman's 'History of the American War'" (1794).

CLINTON, Henry Fynes, an English author, born at Gamston, Nottinghamshire, Jan. 14, 1781, died at Welwyn, Hertfordshire, Oct. 24, 1852. He was a descendant of Henry, second earl of Lincoln, and his father, Charles, a clergyman, assumed in 1821 the surname of Fynes-Clinton. He was a graduate of Oxford, and a member of parliament for Aldborough from 1806 to 1826. He was one of the most diligent students of Greek and Latin literature; and his two principal works, the *Fasti Hellenici* (3 vols., Oxford, 1824-'34) and *Fasti Romani* (2 vols., 1845-'50), are thorough and scholar-like treatises on the civil and literary chronology of Greece and Rome.—See "Literary Remains of H. F. Clinton," by C. J. F. Clinton (1854).

CLINTON, James, an American soldier, the fourth son of Charles and father of De Witt Clinton, born in Ulster co., N. Y., Aug. 9, 1736, died at Little Britain, Orange co., Dec. 22, 1812. After receiving an excellent education, he joined the army, served in the French war as a captain under Col. Bradstreet, and distinguished himself in 1756 in the capture of Fort Frontenac, and of a sloop of war on Lake Ontario. In 1763 he commanded four regiments for the protection of the western frontiers of Ulster and Orange against the incursions of the Indians. He was appointed colonel at the outbreak of the revolutionary war, and toward the close of 1775 accompanied Montgomery to Canada. Promoted to the rank of brigadier general, he was with his brother, Gov. George Clinton, in command at Fort Clinton, on the west bank of the Hudson, when in 1777 that fort was stormed by the English; and after a gallant resistance, he escaped severely wounded with a part of the garrison across the river. In 1779 he coöperated with Gen. Sullivan in his expedition against the Iroquois. Crossing the Mohawk to Lake Otsego, one of the sources of the Susquehanna, down which he was to join Sullivan, he dammed the lake, and then by breaking the dam away produced an artificial current which carried his boats rapidly to the point of junction. An army of Indians and tories was soon after encountered and defeated at Newtown, now Elmira. He afterward commanded at Albany, and was present at the siege of Yorktown and surren-

der of Cornwallis, and at the evacuation of New York by the British. After the close of the war he became commissioner to adjust the boundary between New York and Pennsylvania, delegate to the convention for adopting the federal constitution, and to that of 1801 for amending it, and member of the assembly and senate of New York.

CLIO, in Greek mythology, the daughter of Zeus and Mnemosyne, and the muse of glory and history. She is usually represented sit-



Clio, from an Antique Representation.

ting, with an open roll of papyrus in her left hand. Sometimes she holds a lute in one hand and a plectrum in the other.

CLISSA, or **KLISSA**, a fortified town of Dalmatia, Austria, 5 m. N. E. of Spalatro; pop. about 1,500. The importance of its position, on a height commanding the route from Spalatro to the interior of the country, has always rendered it one of the first points attacked by invading armies. The Roman castle of Andretium is supposed to have been situated on Mount Clissa, in the vicinity.

CLISTHENES, an Athenian statesman, the grandson of a tyrant of Sicyon, of the same name, and the son of Megacles, and at the end of the rule of the Pisistratidæ the head of the Alcæonidæ, their chief enemies. When, with the assistance of the Delphic oracle and the Spartans, Hippias was banished from Athens (510 B. C.), Clisthenes, in order to secure his ascendancy over his rival Isagoras, chose the defence of the cause of the people, and succeeded, with the favor of the Pythia, in introducing some important changes in the ancient constitution of Athens; among others, the division of Attica into ten instead of four tribes, each consisting of several demi, under demarchs; the increase of the number of senators from 400 to 500, 50 from each tribe; and, as some say, the law of ostracism, so remarkable in the history of that state. Clisthenes, being suspected of the desire of tyrannical power, was himself banished, but afterward returned, overcoming his enemies. He was grandfather to Pericles.

CLITHEROE, a parliamentary and municipal borough and market town of Lancashire, England, on the E. bank of the Ribble, at the base of Pendle hill, 1,800 ft. high, on the Lancashire and Yorkshire railroad, 216 m. by rail N. W. of London; pop. in 1871, 10,980. It contains an ancient parish church, a mechanics' institute, library, and reading room. There are extensive print works, cotton manufactories, paper mills, iron and brass foundries, and lime kilns, and the remains of a castle of the 12th century.

CLITOMACHUS, or, in the language of his native country, **HASDRUBAL**, a Carthaginian who went to Athens in the 40th year of his age, and, after studying under Carneades, became the head of the new academy on the death of his master in 129 B. C. Of his voluminous works only a few titles are preserved.

CLITUMNUS (now **CLITUMNO**), a little river of Italy, rising near Spoleto, and emptying into the Tinea (now Timia), a tributary of the Tiber. It was famous in ancient times for its sacred character, the beauty of its banks and environs, the excellence of its pastures, and a peculiar breed of snow-white cattle which were in great demand for sacrificial purposes, especially on days of triumph, when, with gilded horns and wreaths of flowers about their necks, the sacred steers of the Clitumnus formed no inconsiderable part of the pomp. Pliny has left a description of the river, its pastures, herds, and groves, and its little temple sacred to Jupiter Clitumnus, the remains of which are yet to be seen on the road between Spoleto and Foligno.

CLITUS, surnamed **MELAS** (the Black), a Macedonian general, foster-brother and a familiar friend of Alexander the Great, whose life he saved at the battle of the Granicus, 334 B. C. He was afterward appointed commander of a division of the royal guards, and in 328 satrap of Bactria. On the evening before he was to set out for his government he was slain by Alexander at a banquet at Maracanda in Sogdiana, when both parties were excited by wine, and Clitus had provoked the conqueror's resentment by speaking of the glory of Philip as greater than that of Alexander. The king repented bitterly of his rash deed, and caused a splendid funeral service to be held in honor of his victim.

CLIVE, **Robert**, lord, baron of Plassey, a British soldier and statesman, born at Styche, Shropshire, Sept. 29, 1725, died by his own hand in London, Nov. 22, 1774. He early displayed a bold and unmanageable temper. A clerkship having been gained for him in the service of the East India company, at the age of 18 he sailed for Madras, the voyage occupying more than a year. The only gentleman to whom he had a letter of introduction had left India before Clive's arrival, and he soon found himself in miserable circumstances. He was several times near being dismissed for insubordination, and twice he attempted suicide. On the second occasion, when the pistol missed

fire, he exclaimed that he must be reserved for something great. Madras having fallen into the hands of the French, Clive at night fled from the city, disguised as a Mohammedan, and arrived safely at Fort St. David. He now, at the age of 21, obtained an ensign's commission in the military service of the company, and distinguished himself in several operations against the French. Although peace was soon concluded between England and France in Europe, the French and English trading companies in India continued to be upon hostile terms. Dupleix, the French commander, had gained absolute power over the Deccan, the nominal native ruler being only a puppet set up by himself. The English were alarmed for their establishments, even for their existence in India. They recognized Mohammed Ali as nabob of the Carnatic, against Chunda Sahib, supported by the French; but his dominions now consisted alone of Trichinopoly, and even this place was besieged by Chunda Sahib and the French auxiliaries. Arcot, the capital of the Carnatic, was decided upon as a point of attack; and in the absence of Major Lawrence, who had gone to England, all eyes were turned to Clive. He was now 25 years of age, and had acquired a name for desperate courage, sagacity, and military genius. He assured his superiors that unless some decisive move was at once made on Arcot, Trichinopoly would fall, and the French, becoming entire masters of India, would expel the English. His advice prevailed, and he was placed at the head of 200 British troops and 300 sepoys. He marched on Arcot and took it without a blow, the garrison being panic-struck; but knowing that he would not be long suffered to remain unmolested, he made vigorous preparations for defence (August, 1751). As soon as the news reached Chunda Sahib, he invested Arcot with about 10,000 men commanded by his son, Rajah Sahib. For more than 50 days Clive sustained the siege against this overwhelming force; his little band in the mean time, although suffering with hunger, manifesting great devotion to their young commander. An attempt by the government of Madras to relieve him had failed, but a body of 6,000 Mahrattas were on the march to succor the English. Before they could arrive, Chunda Sahib determined to storm the fort. He chose for the day of the assault the anniversary of the death of Hosein, the son of Ali, when devout Mussulmans are stirred to the wildest fanaticism, and have an implicit faith that whoever then falls in battle against the infidel passes at once to the eternal joys of paradise. Clive had received secret notice of the proposed attack, and had made arrangements to meet it. The enemy came on driving elephants before them, whose foreheads were armed with iron plates to batter down the gates. As soon as they felt the musket balls, they turned furiously around, and threw their drivers into confusion. Clive everywhere animated his troops, exposing him-

self to the greatest dangers; and after three desperate assaults and an hour's conflict, the assailants retired behind the ditch, and under cover of night retreated, leaving several guns and a quantity of ammunition. They lost 400 men, while the besieged lost but 5 or 6. This exploit was received at Madras with exultation; 200 English soldiers and 700 sepoys were sent to Clive, who at once began offensive operations. He took the fort of Timery, joined a party of Mahrattas, attacked Rajah Sahib, who had 5,000 men, of whom 300 were French, defeated him, seized his military chest, routed him in a second battle, marched to Fort St. David, and on his way razed to the ground the monument which Dupleix had erected to his own glory, as well as the city which had since sprung up in the vicinity. Clive now triumphed everywhere, although in some cases his troops were of the worst order. The important forts of Covelong and Chingleput, garrisoned by French soldiers, fell into his hands; and after these successes he returned to Madras and married Miss Maskelyne, sister of the celebrated astronomer royal. His health was much broken, and he shortly afterward sailed for England. On his arrival there in 1753, he was received with the highest distinction. The East India company presented him with a rich diamond-hilted sword, which he refused to accept until one of equal value was voted to his superior officer, Major Lawrence, whose merits he declared not inferior to his own. He remained about two years in England, spending his money profusely, aiding his poor relations, and contesting a seat in parliament, to which he was elected, but was at once deprived of it by the vote of a small majority in the house. In 1755 he embarked for India with the rank of lieutenant colonel. He was now employed, in connection with Admirals Watson and Pocock, in reducing the stronghold of Gheriah, the haunt of a pirate named Angria, the terror of the Arabian sea. The place was captured, and booty to the amount of £150,000 divided among the conquerors. He then proceeded to his government of Fort St. David, and had been there but about two months when Surajah Dowlah, the nabob of Bengal, seized Fort William, the citadel of Calcutta (June 20, 1756), and flung his English prisoners, 146 in number, into the garrison prison, known as the "black hole," a dungeon only 18 ft. square, and all except 23 of them perished. (See BLACK HOLE.) To inflict vengeance for the massacre, an expedition was placed under the joint command of Clive and Admiral Watson; and 900 English infantry and 1,500 sepoys sailed from Madras in October, but owing to head winds did not reach Bengal until December. The nabob was at Moorshedabad when he heard of the arrival of the English on the Hoogly, and instantly assembled his army and marched toward Calcutta. Clive took Budgebudge, Fort William, and Calcutta, and stormed and sacked Hoogly

(January, 1757), when the nabob thought it best to come to terms, which Clive was unwilling to allow, but was overruled by a committee of the company's servants. The negotiations between Surajah Dowlah and the English were conducted chiefly through two agents, Mr. Watts, an Englishman, and Omichund, a treacherous Bengalee. From the nabob's cruelties and insignificance, a plot was formed against him, and Clive lent all his influence to the conspirators in aid of their plan of deposing him and placing Meer Jaffier, the principal commander of the nabob's troops, on the throne of Bengal. In return for this aid Meer Jaffier was to make the most ample rewards to the English. Omichund, who had the entire confidence of Surajah Dowlah, by systematic deceit lulled all his suspicions. Clive knew Omichund to be a villain, and was resolved to outdo him in deceit if necessary. Meanwhile he was writing the nabob the most friendly letters, and at the same time plotting with his general, Meer Jaffier, who was to desert his master at a critical moment with large bodies of troops. Just as the plot was ripe, Omichund played false to the English, and demanded as the price of good faith £300,000, or he would divulge the whole scheme to Surajah Dowlah. Clive, in order to punish Omichund for his treachery, resolved himself to act the part of a traitor. He promised what was asked. The wily Bengalee insisted that his claims should be mentioned in the treaty between Meer Jaffier and the English. Clive had two treaties drawn up, the real one on white paper, and a spurious one on red. The white contained no mention of him. To the red one, which Omichund insisted should bear Admiral Watson's signature, that officer refused to affix his name, and Clive was actually accused of having forged it, although he afterward denied the charge. All was now ready. Watts fled secretly from Moorsshedabad, and Clive put his troops in motion. The battle which followed proved of immense importance for the power of Britain in India. Clive's army consisted of 3,000 men, only 900 of whom were Europeans. He met the Indian forces within a mile of Plassey, June 23. The latter consisted of 40,000 infantry, armed with firelocks, pikes, bows and arrows, and swords, with 50 pieces of huge cannon drawn into the field by elephants and oxen, supported by 15,000 cavalry from the northern provinces, far superior to those of the Carnatic. The nabob's ordnance opened fire with little execution, while the well trained English artillery was served with deadly effect. The nabob ordered a retreat, upon which Clive advanced, and the enemy fled in utter rout; only 500 were killed, but they lost all their ordnance and equipage. The English loss was 22 killed and 50 wounded. Meer Jaffier had given no aid during the action, but, drawing off his forces when it was decided, was shortly installed by Clive as nabob of Bengal, Behar, and Orissa; while Surajah Dowlah

fled, but was captured a few days afterward, and executed by the orders of his late general. Meer Jaffier was now called upon to reward his allies, and Omichund came among the rest; but on being told how he had been overreached by Clive, he sank into idiocy, and died a few months afterward. Immense wealth now fell upon the company, and Clive was conducted by Meer Jaffier into the great treasury of Bengal at Moorsshedabad, with full leave to help himself, and he took about £250,000. Later in life, when his conduct was impeached in the house of commons, he vigorously defended himself before the committee, and, alluding to the wealth showered upon him, described the glittering heaps on which he had gazed, and exclaimed, "By God, Mr. Chairman, at this moment I stand astonished at my own moderation." Clive's great victory over Surajah Dowlah was soon followed by the defeat of the army of the Great Mogul, sent against Meer Jaffier, which he overcame at Patna; and in 1759 by his victory over the troops sent by the governor of Batavia under pretence of assisting the Dutch colonies, but really to disturb the British in their possessions. New honors and wealth were showered upon him, and Meer Jaffier granted him an annual revenue of £28,000. In 1760 he returned to England, where he was raised to the Irish peerage with the title of Baron Clive of Plassey, and was elected to parliament as one of the members for Shrewsbury. He remained in England about four years, applying himself chiefly to Indian affairs, while his immense fortune enabled him to live in magnificence. During his absence from Bengal the affairs of the company fell into utter confusion; it was not enriched, while crowds of adventurers returned from India with splendid fortunes, acquired in a short time from systematic oppression and plunder of the hapless natives. At length these evils reached such a pitch that the speedy ruin of the Anglo-Indian empire was prophesied unless some strong hand should interpose, and Clive was looked to as the only man who could save it from destruction. After much solicitation he consented to go back to India, and was appointed governor and commander-in-chief of the British possessions in Bengal; and in May, 1765, for the third time he reached Hindostan. At Calcutta he found everything fearfully disorganized, far more than he had anticipated. But he proceeded at once to the reformation of all abuses in spite of great opposition. On one occasion 200 officers of the army, who had been engaged in commercial speculations, combined and resigned their commissions, thinking to terrify him into submission by the spectacle of an army without leaders. Clive instantly issued commissions for new officers, even to mercantile agents who were disposed to aid him; the sepoys he had himself trained in battle stood firm in their devotion to him, and he ordered that every officer who resigned should at once be brought to Calcutta. The insubordination was quelled,

the ringleaders were punished, and the others pardoned. He returned from India, July 14, 1767. In 1772 his proceedings in India were made the subject of public discussion, and in 1773 a select committee of investigation was appointed by the house of commons. Clive successfully vindicated his conduct. The charge of fraud brought against him was rescinded by a vote of the house, and a motion agreed to by a large majority, "that Lord Clive had rendered great and meritorious services to his country." But for some time his health had been giving way, and to relieve his sufferings he resorted to opium, which gradually ruined his strong intellect. He had labored all his life under periodic fits of melancholy, and in one of these he committed suicide.—See Malcolm, "The Life of Robert Lord Clive" (3 vols. 8vo, London, 1836), and Macaulay's review of it (1840); and Gleig, "Life of Lord Clive" (1848).

CLOACÆ (Lat. *cloaca*, a conduit, pipe), the sewers of ancient Rome. The trunk drain, called the *cloaca maxima*, is formed by three tiers of concentric arches overlying each other in contact; the whole work is 15 ft. wide by 30 ft. in height. The masonry is of hewn stone, laid without cement. Along this subterranean street the drainage of the city, as well as the surplus waters of the aqueduct, discharged themselves into the river. The cleansing and repairing of the cloacæ were confided at first to the censors, afterward to the ædiles, and subsequently to commissioners entitled curators of the cloacæ, who employed convicts in the work, and levied the expense by assessment. Tarquin the Elder is said to have originated these works about 150 years after the foundation of the city, for the purpose of draining the marshy ground between the Palatine and Capitoline hills. Agrippa sailed through the *cloaca maxima* in a boat. Nero caused his victims to be thrown into the sewers. The cloacæ yet serve in part for the drainage of Rome, and several modern cities are drained similarly.

CLOACINA, one of the Roman surnames of Venus. Pliny derives the appellation from the obsolete verb *cloare* or *cluere*, to wash, and adds that when the Sabine women prevented their relatives from taking vengeance on their ravishers, both armies purified themselves by rites before the statue of Venus, who was hence called goddess of purification. Livy attributes the appellation to the circumstance that the Sabine king Titus Tatius found a statue of Venus in the *cloaca maxima*, which he set up, and consecrated under the name of Venus Cloacina.

CLOCKS AND WATCHES, instruments for measuring time. In early ages any device for this purpose received the general name of horologium (Gr. *ὥρολόγιον*, hour-teller), whether it was a sun dial, clepsydra, sand glass, or clock. As late as the reign of James I. of England, clocks were often called horologes. Until the 14th century the word clock was applied only

to the bell (A. S. *cluega*, Ger. *Glocke*) upon which the hour, determined by the horologe, was rung. Even at the present day the clock of Wells cathedral is called the horologe. The most ancient of all instruments for ascertaining the time of the day was probably the sun dial, although for measuring intervals or stated periods of time water vessels, called clepsydras, may have been of contemporary use. It is commonly believed that the first form of sun dial was simply a column which cast a shadow of varying length and position. The earliest mention in history of a sun dial is in 2 Kings xx. 11: "And Isaiah the prophet cried unto the Lord; and he brought the shadow ten degrees backward, by which it had gone down in the dial of Ahaz." As, however, the invention of the sun dial has been attributed to Anaximander, about 200 years later, there is some doubt as to the meaning of the word which has been translated dial, for in the same passage the word degrees has the same derivation. But the instrument referred to could hardly mean anything else than a sun dial of some form, as otherwise the passage would have no significance. At Rome, the first sun dial is said to have been erected by L. Papirius Cursor, 292 B. C. Another was placed near the rostra about 30 years after by the consul M. Valerius Messala, who brought it from Sicily during the first Punic war. The first form of horologe which measured time by mechanical means was the clepsydra or water clock, but the date of its introduction cannot be traced. It is believed that it was used before the sun dial in China, Chaldea, and Egypt. (See CLEPSYDRA.) Sand glasses took the place of clepsydras in the early part of the Christian era, but the date of their earliest use is uncertain. The candle clock of Alfred the Great, and its conversion into a lantern by means of a translucent horn cover, by which he divided the day into three equal portions, one of which he devoted to religion, one to public affairs, and the third to rest and recreation, is familiar to most readers. The time of the introduction of wheel clocks moved by weights cannot be fixed with any more certainty than that of clepsydras. From the time of Archimedes, 220 B. C., to that of Robert Wallingford, abbot of St. Albans, in 1326, many ingenious men have been credited with the invention. To Boëthius (A. D. 510) has been accorded the honor, notwithstanding that it has been disputed whether it was a water or a wheel and weight clock which Pacificus of Verona, who lived nearly four centuries later, constructed, on the ground that the date was too early for such an invention. As, however, Gerbert, who became pope as Sylvester II., did undoubtedly construct a wheel and weight clock at Magdeburg in 996, when he was archbishop, the belief that Pacificus might also have made one a little more than a century earlier is not unreasonable. But, however much the earlier history of clocks may be involved in doubt, it is certain that clocks driven

by weights were in use in the monasteries of Europe in the 11th century. The Catholic clergy are credited with the introduction of clocks into England. They possessed much wealth, and had leisure to cultivate many of the arts, and were probably led to the cultivation of horology from the desirableness of having some means of regulating their religious services. The first Westminster clock is said to have been erected from the proceeds of a fine which was imposed upon a chief justice of the king's bench about 1290. The Exeter cathedral clock, the striking part of which is said to be still in use, was constructed before 1317, and one was made by Wallingford in 1326. The cathedral clocks of Wells, Canterbury, and Peterborough were also made about

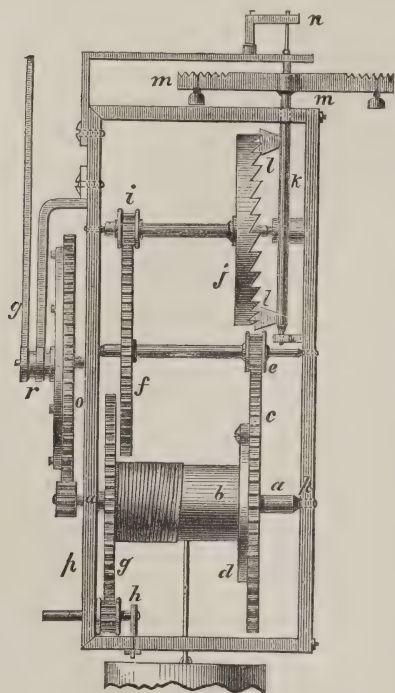


FIG. 1.—Vick's Clock.

that time. The first clock on record which approached in accuracy of movement the clocks of the present time was constructed for Charles V. of France by Henry Vick, in 1370. In fig. 1, representing this clock, the weight is suspended by a cord wound round the barrel *b*, which carries a ratchet *d*. This ratchet, acting upon the great wheel *c* in one direction, will cause it to be driven by the weight. The great wheel *c* drives the pinion *e*, upon whose arbor or shaft is placed the wheel *f*. This again drives the pinion *i*, upon whose arbor is placed the crown wheel *j*, which in this clock forms the scape wheel, the action and office of which in the regulation of time will be described further on. This scape wheel, constant-

ly moving in one direction, gives an impulse to the pallets or levers *l l*, whenever they are brought within the range of its teeth; and this they are made to do by the backward and forward vibrations of the weighted balance *m m*, suspended by the cord *n*. These vibrations, caused by the action of the teeth in the scape wheel upon the pallets, being isochronous, or nearly so, divide the time of the successive escaping of the teeth of the crown wheel into equal parts. This balance was indeed a rudimentary balance wheel; a rim added, making it the diameter of a circle, and a hair spring in place of the cord, would have made it one. The turning of the single hand once around in 12 hours was accomplished by having the arbor of the barrel pass through the front plate *p*. A pinion upon this arbor, which turns once in an hour, pitches into the large wheel *o*, which has 12 times as many teeth as the pinion has leaves, and which will therefore revolve once in 12 hours. The appliance for winding consists of the pinion *h* at the lower part of the clock, which is made to turn the wheel *g* by means of an arbor which passes through the face of the clock, and which is squared to fit a key. The contrivance for regulating the motion of the last wheel is called the escapement, and the wheel is called the scape wheel, whether of the modern form or the old-fashioned crown wheel of Vick, used for nearly three centuries after in clocks, and for a much longer time in watches. It is the most essential part of the timepiece; and upon its adjustment, after the application of the pendulum, nearly all the study relating to the subject of horology has been expended. It is called the escapement, because each tooth of the scape wheel is allowed to escape from certain arms of the pendulum called pallets, after having been arrested during a period of time. But the performance of this clock must have been quite imperfect, although it was a marvel of mechanism in its day. It needed an escapement capable of making a more accurate division of time. It was impossible at that time, although it has since been accomplished, to cause the balance to oscillate in exactly equal spaces of time. The first instrument used for this purpose was the pendulum, which it can scarcely be doubted was employed in the early ages to measure small periods of time by simply counting its vibrations, without connecting it with mechanism. It is said that the ancient astronomers measured the duration of eclipses with it, but there is no recorded proof of its use before the discovery of Galileo at Florence in 1582, by observations upon a swinging chandelier, that a pendulum vibrated in arcs of different lengths in the same time, if the arcs were small. It has been said that a pendulum clock was made for St. Paul's church in Covent Garden by Harris, a London clockmaker, in 1642; but this must be an error, or the controversy could never have taken place between Dr. Hooke and Huygens, who is now univer-

sally admitted to have been the first not only to apply the pendulum to clocks, but to demonstrate the mathematical principles involved. A pendulum which oscillates in an arc of less than 10° may have that arc diminished without sensibly affecting the time; but when it moves through larger arcs the time will be sensibly increased, although not in proportion to the increase of the arc. It was demonstrated by Huygens that if the oscillations were made in the curve of a cycloid, they would occupy the same time whether the arcs were small or large. A simple pendulum may be defined to be a particle of matter suspended by a right line devoid of weight, and oscillating by the force of gravity about a fixed point, called the point of suspension. It follows, therefore, that a truly simple pendulum can only exist in the imagination. The nearest approach to it is a lens-shaped bob, made of the densest matter, as platinum, suspended by a fine steel wire. But it is evident that the particles of matter in the bob which are nearest the point of suspension will tend to oscillate oftener than those at a greater distance, and therefore to accelerate the motion, while those which are furthest will tend to retard it. There will therefore be a certain distance from the point of suspension which will divide those particles which are moving slower than natural from those which are moving faster, which may be designated the centre of oscillation of the system. If all the matter in the pendulum could be collected in this point, the time of vibration would not be changed. The length of a pendulum is understood to be the distance between the point of suspension and the centre of oscillation. The centre of oscillation is generally below the centre of gravity, and within the pendulum; but it may be entirely beyond it, as in the metronome. The length of a pendulum which oscillates in a given time may be ascertained from the laws of falling bodies. If it moves in a small circular arc, the time of one oscillation is to the time a body occupies in falling freely half the length of a pendulum as the circumference of a circle is to its diameter. It having been demonstrated that the spaces through which a body falls by the force of gravity are in proportion to the square of the time occupied in falling, therefore the time will be equal to the ratio of the circumference of a circle to its diameter (which is 3.14159) multiplied into the square root of the quotient arising from dividing the length of the pendulum by twice the distance through which a body will fall in one second, which in the latitude of Washington is about 16.08 ft. Thus: $\text{Time} = 3.14159 \times \sqrt{\text{length} \div 32.16 \text{ ft.}}$; from which all calculations as to the number of wheels in the train, the distance through which the weight should descend, &c., may be made. From the above equation, by a very simple algebraic process, the following is derived: $\text{Length} = \text{square of time} \times 32.16 \div 3.14159^2$; therefore the length of a pendulum is in propor-

tion to the square of its time of oscillation. The length of a pendulum which oscillates in one second in the latitude of Washington will be found by the following equation: $L = 1^2 \times 32.16 \text{ ft.} \div 3.14159^2 = 39.1 \text{ in.}$ If the pendulum is required to oscillate once in two seconds, it must be four times the length of a seconds pendulum, because the square of twice the time $= 4$. As it is necessary in a good clock to have the pendulum always of the same length, a difficulty was encountered on account of expansion and contraction from heat and cold. This was obviated by using in its construction two different materials having different degrees of expansion. Such pendulums are called compensation pendulums, and are principally of two kinds, called mercurial and gridiron. The bob of the mercurial pendulum is made of a hollow

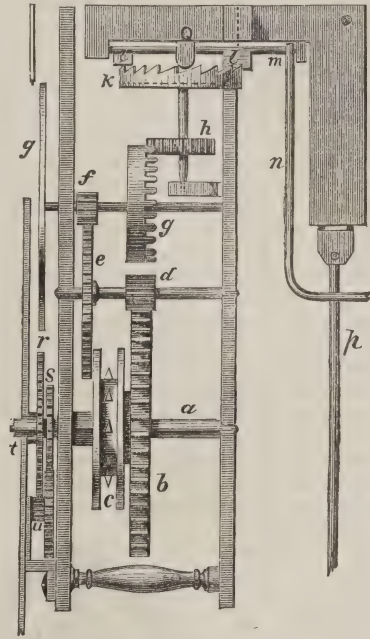


FIG. 2.—Huygens's Clock.

cylinder of glass or iron containing mercury, whose expansion tends to shorten the distance of the centre of oscillation, while the expansion of the rod tends to lengthen it. The gridiron pendulum is usually constructed of iron and brass, whose unequal contractions cause the bob to remain during varying degrees of temperature at the same distance from the point of suspension.—The clock constructed by Huygens is represented in fig. 2. The train of wheels resembles that in Vick's clock, with the exception of having two crown wheels, with different-shaped teeth, and a train of wheels behind the dial and in front of the plate for the purpose of turning both hour and minute hands around a common centre. This train of wheels for moving the hands has precisely the same disposition as that now in use for

clocks and watches, which is represented in fig. 16. The fork *n*, moved by the pendulum *p*, takes the place of the balance in Vick's clock, and by its more isochronous vibrations produces a more accurate escapement. The pallets *l l*, carried by the verge, act upon the crown scape wheel *k*, in a similar manner as in Vick's clock. The arbor of the wheel *g* passes through the front plate, and carries a disk upon which there are 60 divisions. As this wheel turns around once in a minute, each division marks a second, and an index placed upon the dial, at the edge of an opening in it, measures the divisions as they pass. A seconds hand could have been placed upon the arbor in place of the disk, and caused to turn in front of a graduated circle in the manner now employed. The verge and crown wheel escapement which Huygens employed made it necessary to use short pallets, in order to prevent too much recoil, and consequently the use of a short pendulum vibrating in a large arc. Thus there was the unavoidable introduction of more or less error, which he sought to correct by the use of cycloidal cheeks against which a flexible pendulum was made to swing, and thus to carry the bob through a cycloidal curve. But although the theory was an illustration of Huygens's genius, it was found not to be applicable in practice, and the solution of the difficulty was more easily found by making the pendulum longer and the bob heavier, and causing it to swing in a smaller arc. The application of an escapement by which the pendulum was only required to oscillate in a small arc was accomplished by Dr. Hooke, an English contemporary of Huygens, by means of a pair of anchor-shaped pallets moving in the plane of a spur wheel having ratchet teeth, instead of using a crown wheel. This escapement produces a recoil, and is usually called the recoil escapement. It is shown in fig. 3. When the pendulum swings to the left it lifts the pallet *a* from the upper face of the tooth *t*, which has now passed by, while the pallet *b* has also moved to the left, meeting the tooth *t'*, and by the momentum of the pendulum producing a recoil till it returns and allows the tooth to move on, giving at the same time the pallet *a* an impulse, the pendulum swinging to the left until the pallet *a* is brought within reach of the tooth *c*, which strikes it before the pendulum has attained the limit of its vibration, thus producing another recoil of the scape wheel, which lasts

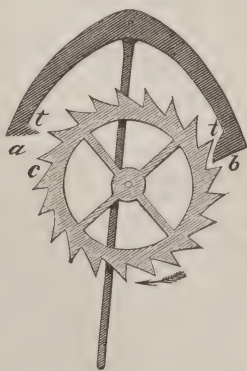


FIG. 3.—Recoil Escapement of Hooke.

till the pendulum begins to return and lift the pallet away. The impulse faces of the pallets are convex; theoretically they should be concave, but on account of friction the convex form has been found to answer the purpose better. This recoil or anchor-pallet escapement was succeeded by what is called the dead-beat escapement, invented by Graham about 1720, and which is the one now in general use for clocks, and with but little modification for watches. It is represented in fig. 4. When the pendulum swings to the right the tooth *a* escapes from the pallet *b*, while the tooth *c* is brought against the pallet *d*; but a portion of the exterior surface of this pallet, and also the interior surface of *b*, are arcs drawn from the centre *e*; and upon being struck by the teeth of the scape wheel in the direction of *e* no recoil is produced, neither is there any impulse given to the pallet until the pendulum swings far enough to the left to bring the tooth upon its impulse face. When the pendulum attains the limit of its vibration to the left, the same dead beat is made upon the circular inner face of the pallet *b*, to be followed by an impulse upon the impulse face when the pendulum has again returned far enough to the right. For the purpose of avoiding friction, and for other reasons of which the limits of this article exclude a statement, it has been found that the teeth should be made to fall upon the dead face of a pallet as near to the angle which divides it from the impulse face as possible. There is a tendency in the dead-beat escapement to gain time as the arc of vibration of the pendulum decreases, whereas the tendency in the recoil escapement is to lose. The further the pallets are from the centre of motion, the greater will be the distance traversed over them by the teeth, and consequently the greater the friction; therefore the best clock makers place them as near the centre of motion as circumstances will allow, the usual practice being to have them describe an arc whose radius is equal to that of the scape wheel, and to have the dead faces embrace $10\frac{1}{2}$ teeth, or one half tooth over one third the number in the wheel. There is one other form of escapement, often used in turret clocks, called the pin-wheel escapement, shown in fig. 5. The invention is ascribed to Lepaute of Paris in 1755. The form usually described has the pallets placed on opposite sides of the scape wheel; but that is unnecessary, and the construction represented in the figure exhibits the plan better. In the relative position of the pallets and pen-

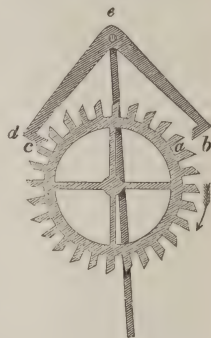


FIG. 4.—Dead-beat Escapement of Graham.

dulum the action of the pins is downward on both pallets, which have the impulse faces cut to nearly the same angle, the one on the shorter and outside arm being rather the more oblique when they are to receive the pins on a level with the axis of the scape wheel. It will be observed that the pallets may be made to receive the pins at any part of the revolution of the wheel by changing their position with the pendulum; and it is also evident that the form of the pins and pallets may be such as to either produce a recoil of the scape wheel or a dead beat. Another kind are called gravity escapements, because the impulse is not given to the pallets directly by the action of the train weight, but by another weight or spring which is caused to act for a sufficient space of time at every beat of the pendulum. There are several forms of gravity escapements, as Mudge's, Cumming's, Hardy's, Kater's, Bloxam's, and others.—In order that a timepiece may be kept running, there must be a contrivance for winding up the weight or spring. As it is evident that this must be done without reversing the motion of the train, there has to be provided an arrangement for turning the barrel backward without turning the great wheel. This is effected by means of a ratchet wheel, which is prevented by a click from moving on the great wheel in the direction of the going of the train, but is free to move in the contrary direction. Without some further contrivance, however, than what is necessary to prevent the great wheel from being turned back, the clock would soon stop, because the propelling power is taken away during the winding. Such

a contrivance is called a maintaining power or going barrel, the principal form of which in present use is Harrison's maintaining spring and ratchet, or going barrel. The oldest of all is Huyghens's endless chain shown in fig. 6, which is so contrived as not to take the weight off the barrel during the winding. By pulling down the small weight the large weight is raised without taking the tension of the cord off from the going wheel at all. The pulley may be placed upon the arbor of the great wheel of the striking part, which must then be attached to it by a ratchet and click. Harrison's going barrel is represented

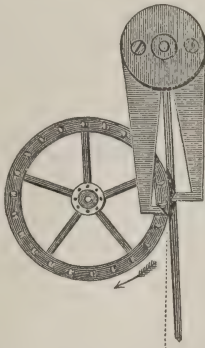


FIG. 5.—Pin-wheel Escapement of Lepaute.



FIG. 6.—Huyghens's Endless Chain.

in the train of wheels in a clock shown in fig. 7. The weight moves the great wheel *c* through the spring *d*; but during winding the smaller ratchet is turned to the right, taking off the weight, while the spring, acting against the larger ratchet, impels the great wheel a sufficient time to keep it going, and thereby to maintain the motion of the scape wheel and the impulse of its teeth against the pallets. Common clocks, many of them keeping good time, are now made to be driven by a main spring instead of a weight, in the manner of a watch. Being portable, and occupying less space, they are more convenient and cheaper; but the best clocks, used for regulators, are driven by weights.—It will now be proper to describe the train of wheels and principal parts of a clock. The train comprises those wheels through which the motive power, the weight or spring, exerts its force upon the pallets connected with the

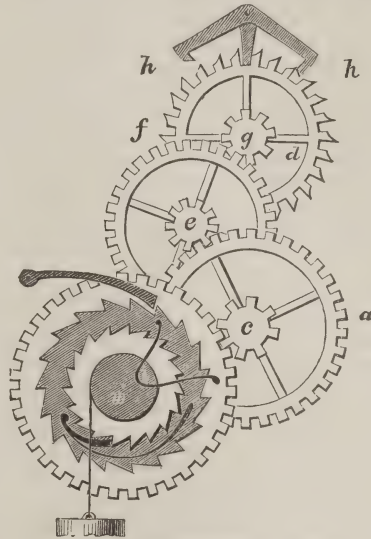


FIG. 7.—Train of Wheels in a Clock.

pendulum. These wheels are made to act upon each other by means of pinions, which are a kind of small cog wheels. The cogs on the wheels proper are called teeth, while those of the pinions are called leaves. The axis upon which a wheel or pinion turns is called the arbor. The train of wheels in a good modern eight-day clock generally consists of four. In fig. 7, *a* is the first or great wheel, upon whose arbor is the barrel over which the cord passes to which is suspended the weight. The second or centre wheel, *b*, whose pinion *c* is driven by the great wheel, always turns round once in an hour, and is therefore made to turn the minute hand. It drives the pinion *e* of the third wheel *d*, which again drives the pinion of the scape wheel *f*. This last is the fastest-going wheel in the train, and is the one that acts upon the pallets connected with the pendulum. The usual number of teeth in the

scape wheel is 30, and if the pendulum is 39.1 inches in length, it will revolve once in a minute, because one tooth will escape at every double vibration (sometimes called a complete vibration), or every two seconds. If the pinion has 7 leaves, and the third wheel, which drives it, has 56 teeth, the latter will revolve once in 8 minutes; and if its pinion has 8 leaves, each leaf will pass a certain point every minute; and therefore, if the centre wheel has 60 teeth, it will revolve once in an hour. If the pinion of the centre wheel has 8 leaves, and there are 96 teeth in the great wheel, the latter will turn round once in 12 hours. This arrangement formerly existed in clocks before the use of the minute hand, but since then wheels, separate from the train have been used to move the hands at the proper rate. In the engraving a back view of the wheels is given, not placed in relation to each other just as they are when in actual use, but every wheel, following in order from below upward, placed behind its predecessor, for the purpose of showing the pinions. The wheels may be arranged in this way, but they are generally placed alternately in front of and behind each other, for economy of space. The second wheel, as has been stated, moves the minute hand. The pinion by which the great wheel drives it is called the centre pinion. This is on the back side of the wheel, but it carries another pinion in front, called the cannon pinion, which is placed on the arbor so that it may be turned by using a certain amount of force, an operation which is required in setting. It is upon a tubular barrel of this cannon pinion that the minute hand is placed. The cannon pinion has a certain number of leaves, which play into a wheel having, we will say, four times as many teeth, which latter has a pinion with a certain number of leaves which again play into another wheel having three times as many teeth. This wheel, called the hour wheel, will then turn round once in 12 hours, and upon its barrel, which is placed over the cannon pinion, the hour hand is fixed. The time during which a clock can be made to run from one winding to another, measured by the number of times the scape wheel can be made to revolve, depends upon the number of teeth in the train of wheels, the distance through which the weight falls, and the length of the pendulum. The number of teeth may be regulated by the number of wheels in the train, or by the number of teeth in each wheel and pinion. If the weight falls through a small space, the number of teeth must be increased, and this is usually done by increasing the number of wheels, which again requires the gravity of the weight to be increased. The number of teeth in the train remaining the same, the duration of running may be increased by increasing the distance through which the weight falls.—About the year 1840 Prof. Wheatstone exhibited to the royal society of London a clock dial, the hands of which were moved by a wheel acted upon by a small elec-

tro-magnet at intervals, the current being formed and broken by means of the oscillations of the pendulum of a common clock. Through this device the same time may be indicated in several distant places simultaneously. In 1848 successful experiments were made upon this principle by the United States coast survey between Cincinnati and Pittsburgh, a distance of 400 miles. A clock placed in the electric circuit recorded its beats at all the offices along the line by means of Morse's apparatus. The first clock, however, which had any of its own parts moved by electricity, was constructed by Alexander Bain of Edinburgh. In this electricity was used as a motive power in place of the usual weight or spring, and the pendulum was not only employed as a regulator, but as a motor. The bob of the pendulum was formed of a coil of wire which became a magnet at intervals of the oscillations, and, passing over the poles of permanent magnets placed near the ends of the arc of oscillation, was alternately attracted by each. In some of the clocks the two magnets were temporary, and the reversal of their poles by one of the devices used in electrical apparatus caused an alternate attraction and repulsion of the pendulum. Mr. Shepherd exhibited at the international exhibition in London of 1851 a clock in which there was an electrical gravity escapement, the pallets being raised by temporary magnets. A description of it may be found in Wood's "Curiosities of Clocks and Watches," and also in Mr. Denison's treatise.—WATCHES. The first watches must have been very imperfect time-keepers, as they were not supplied with that necessary piece of apparatus which answers the place of the pendulum in clocks, viz., the balance and balance spring, and the escapement consisted only of a verge and a crown wheel, of a similar form to that used in the verge escapement clocks. The train of wheels was moved, like that in the modern watch, by a main spring, which is a coil of ribbon-shaped, finely tempered steel, placed around the arbor of the going barrel, having one end attached to the arbor and the other to the inside of the barrel. The train of wheels in a watch is much the same as in a clock, and indeed a watch may be considered as a small clock, in which the weight and pendulum are replaced by the main spring and the balance, which latter part is composed of the balance wheel and balance or hair spring. The devices for regulating the motion of the scape wheel by means of a lever armed with two pallets, against which the teeth of the wheel are caused to exert their force, are much alike in the modern detached lever watch and a good regulator clock; but as the arc in which the pendulum swings varies but very little, while that in which the balance wheel vibrates varies considerably from different causes (the principal one being the motion given to the watch in carrying it in the pocket), it is apparent that there must be considerable variation in the mode of applying the devices.

The oldest watch escapement was the verge and crown wheel, and had the train of wheels for the going part, as well as for turning the hour and minute hands, arranged in the same way as they were in the clock of Huygens. Fig. 8 represents the old-fashioned English

verge escapement watch. At *a* is shown the barrel containing the main spring; at *b* the fusee around which the chain is wound, constructed in the form of a conical spiral to increase the leverage, as the spring diminishes in power by uncoiling; *c* is the centre wheel,

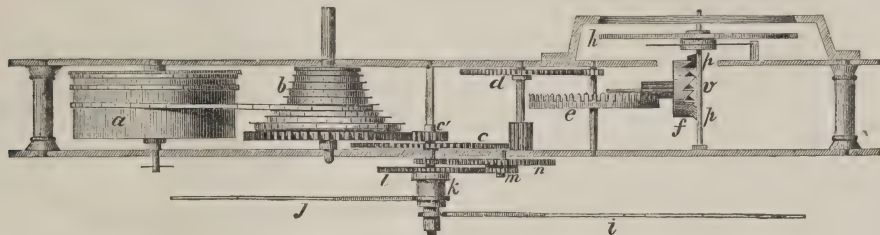


Fig. 8.—Old English Verge Escapement.

turned by the great wheel on the fusee by the centre pinion *c'*; *d* is the third, and *e* the fourth wheel, which drives the crown and scape wheel *f*. The pallets *p, p'*, moving to and fro upon the verge *v*, which is the staff of the balance wheel *h*, regulate the time of escapement of the teeth. The minute hand *i* is placed upon the cannon pinion, and the hour hand *j* upon the barrel *k* of the hour wheel *l*. The arrangement for turning the hands is the same as that shown in fig. 16. The original lever escapement was invented in France by Hautefeuille about 1722, and differed much in its action from the detached lever now in general use. It is known as the rack and pinion lever, and

is represented in fig. 9. The lever *a* has a rack, *r*, having the segment of a cog wheel at one end and pallets, *h, h'*, at the other, and turning upon a pivot called the lever arbor, which is placed in the centre of the circle of which the rack is a segment. The balance wheel *d*, by its vibrations, causes the pinion to carry the rack backward and forward, and consequently moves the pallets at the other end of the lever in about the same way

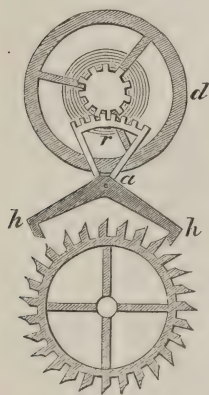


Fig. 9.—Rack and Pinion Lever of Hautefeuille.

they are moved by a pendulum. As, however, the arc through which the balance wheel moves is subject to considerable variation on account of the motion given to the watch in carrying, the differences in the extent of the vibrations of the pallets, and the constant lug between the rack and the pinion, caused an imperfection in the movement which was obviated by a modification invented by Mudge, which was called the detached lever, because the end of the lever which formerly carried

the rack, but which now was made in the form of a crotch or fork, was detached during certain parts of its oscillation. Fig. 10 represents the invention of Mudge, with several modifications in form which have since been devised. He placed the pallets one on each side of the lever arbor, instead of placing them at one end, opposite the fork, as in this figure. A pin in the roller which is placed over the arbor of the balance wheel, and a notch in the bottom of the fork, are so arranged that an alternate locking and detachment takes place at every escape of a tooth in the scape wheel. This detachment relieves the parts of the constant lug which existed in the rack and pinion, and allows the pallets to make perfectly equal vibrations, whether the balance wheel does or does not. This kind of lever is the one now in common use, and likely to be for a long time to come, as it is difficult to imagine any device better calculated to produce uniform motion in the train of wheels of a watch which is intended to be worn in the pocket. The top of the scape wheel *s* is moving to the right, with a constant force derived from the main spring. The pallets *a* and *b* have been moved to the left, so that *b* is out of range, and *a* within range of the teeth. The tooth *c* has locked upon the dead surface of the pallet *a*. The balance wheel is now moving in the same direction as the scape wheel, its top to the right, and its lower part, which is cut away, to the left; the pin upon the roller of the balance wheel has entered the notch in the fork; as soon as it strikes the side below

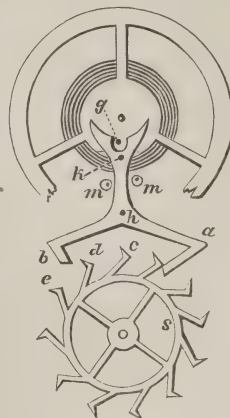


Fig. 10.—Modern Detached Lever Escapement.

the rack and pinion, and allows the pallets to make perfectly equal vibrations, whether the balance wheel does or does not. This kind of lever is the one now in common use, and likely to be for a long time to come, as it is difficult to imagine any device better calculated to produce uniform motion in the train of wheels of a watch which is intended to be worn in the pocket. The top of the scape wheel *s* is moving to the right, with a constant force derived from the main spring. The pallets *a* and *b* have been moved to the left, so that *b* is out of range, and *a* within range of the teeth. The tooth *c* has locked upon the dead surface of the pallet *a*. The balance wheel is now moving in the same direction as the scape wheel, its top to the right, and its lower part, which is cut away, to the left; the pin upon the roller of the balance wheel has entered the notch in the fork; as soon as it strikes the side below

the angle g it will move the fork to the left, turning the lever upon its arbor h , and consequently lifting the pallet a sufficiently to allow the tooth c to fall upon the impulse face of the pallet. In this way the lever will receive a new impulse in addition to the one it received from the balance wheel, so that before the pin gets beyond reach of the side of the notch in the fork opposite g it will be struck by it, and thus an impulse will be given to the balance wheel by which its vibrations will be maintained. It will be observed that the teeth of the scape wheel in this figure differ in shape from those in any scape wheel which has thus far been described. They are called club teeth, and their use will presently be noticed. Mudge used the old ratchet teeth. The alternate lifting and depressing of the pallets to liberate and to lock the teeth is the main object of escapements, and may be effected by three different methods: 1, by having the inclined planes on the pallets alone, and moving them by pointed teeth, as in fig. 9; 2, by having the inclined planes on the scape teeth which move against pallet edges; 3, by having the inclined planes both on the pallets and on the scape teeth, as they are in the detached lever, with club teeth on the scape wheel. In this figure it will be seen that if the scape teeth were ratchet-shaped they would still raise the pallets, because their faces are inclined to the radius of the arc in which they move, although they would not be sufficiently raised. It will be noticed, however, that the toes of the scape teeth move in a larger arc than the heels, and therefore must increase the elevation of the pallets. In this lever it is necessary to make provision against the untimely unlocking of the pallets by irregularities produced in carrying. This is done by the employment of a guard pin and two banking pins. The guard pin k is placed at the junction of the fork with the lever, at such a distance from the lever arbor h that when those two points lie in the radius of the balance wheel, or nearly so, the guard pin will be nearer the balance arbor than is the circumference of the roller; therefore a notch must be made in the periphery of the latter, on the side where the impulse pin is placed. This will allow it to pass only at certain periods in the oscillations of the balance wheel. The banking pins, $m m$, are for the purpose of preventing the lever from being carried too far by any over-impulse of the balance wheel, and their adjustment is a matter of considerable importance, and is secured with great nicety by placing them excentrically upon screws which pass into the pillar plate, as represented in fig. 10.—Before the perfection of the lever, the cylinder, or as it is sometimes termed the horizontal escapement (fig. 11), was introduced by Graham, who invented the dead-beat escapement in clocks. A section of a hollow cylinder is cut out in such a way that its external and internal surfaces are made use of to receive the action of the teeth of the scape

wheel, while the edges are cut at such angles as to form impulse pallet faces. The mode of action in this escapement is like that of the dead-beat escapement in clocks, the outer and

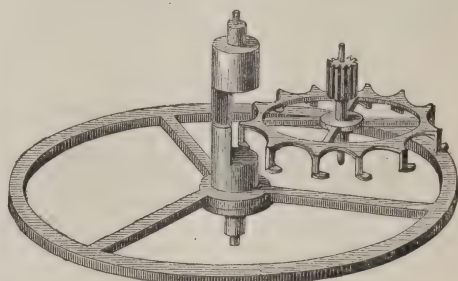


FIG. 11.—Cylinder Escapement of Graham.

inner surfaces of the cylinder forming long dead pallet surfaces, so that the teeth of the scape wheel may slide over them equally well, whether the oscillations of the balance wheel are great or small. Indeed, the general principles upon which all clock and watch escapements are constructed are greatly similar; the chronometer or detached escapement differing more from all the rest than they from each other. The devices and forms are various, but they secure the same desired result by making use of nearly the same mechanical forces and appliances. The production of the chronometer or detached escapement is the work of many ingenious men, but principally of Le Roy, Berthoud, Earnshaw, and Harrison. The construction, as substantially given by Earnshaw,

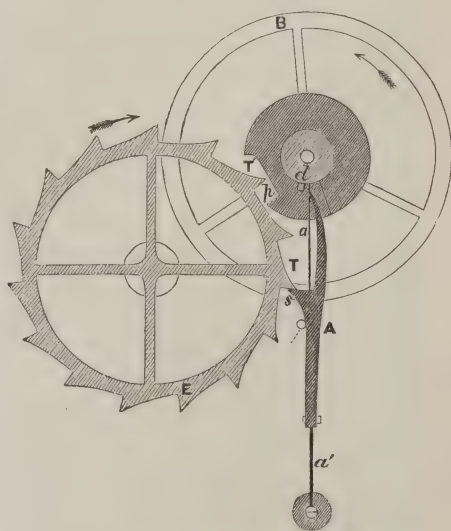


FIG. 12.—Chronometer Escapement of Earnshaw.

is represented in fig. 12. There has been but little change made in it since. The balance wheel B is shown turning in the direction of the arrows, the tooth T resting

upon the stop *S*, which has caused it to make a dead beat. The detent, *A*, is a kind of latch, shown as resting against the pin which is represented opposite the letter *A*. Attached to its upper end is a light spring, *a*, projecting beyond its point. The scape wheel, *E*, is turning in the direction of the arrow by the constant action of the train of wheels. The detent is held against the pin by the spring *a'* at its lower end. A pin, *d*, on the verge of the balance wheel, is moving with the wheel against the spring *a*, and will presently push the detent far enough back to allow the tooth *T* to pass by the stop, and the tooth *T'*, which moves with greater velocity, to overtake and strike upon the impulse face of the pallet *p* before it gets beyond its reach, and thus impel the balance wheel to its full vibration. The fine spring *a* is designed to allow the pin *d* to slip by when the balance wheel returns, but to catch it and force the detent back and allow the tooth *T* to pass the stop when it again moves in the direction of the arrow. The hair spring of the balance wheel is not seen in the drawing, it being placed upon the hidden side of the roller.—The balance wheel of a chronometer is made to preserve a uniform time of oscillation upon the same principle as the gridiron pendulum; that is, by a combination of two metals having unequal rates of expansion and contraction by variations of temperature. The rim of the wheel is made of brass and steel, the former outside of the latter, with a number of pins screwed into it which serve as weights. The invention was made by Harrison, but the method of construction which is now generally employed was introduced by Earnshaw about 80 years ago, and consists in soldering a rim of brass around a disk of steel, and then by means of a lathe and other tools cutting away the greater portion of the disk, leaving two arms projecting from the staff, as represented

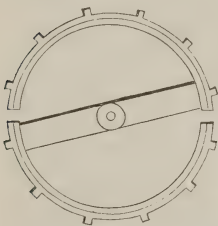


FIG. 13.—Compensation Balance.

in fig. 13. The rim is then sawed in two places, at its junction with the arms, so that during expansion the other end of the segment of the rim may be free to move toward the centre of the wheel, and thus produce sufficient compensation to prevent a change in the time of oscillation. The proper adjustment can only be accomplished by trial, which requires the employment of considerable time and skill, and constitutes one of the items of expense in a chronometer or a good watch. In regard to chronometers, little more need be said after giving a description of the escapement, and the principle of the compensation balance wheel. The escapement is the most perfect that has ever been devised for a timepiece which is to be kept in one position.

It has been attempted to use the chronometer escapement in pocket watches, but without success, great irregularities being produced by change of position, and motion consequent on carrying; but when the timepiece is furnished with a perfectly compensating balance wheel, so that its vibrations are isochronous under any change of temperature to which it may be exposed by the passage of a ship from one zone to another, and it is suspended in gimbals, as represented in fig. 14,

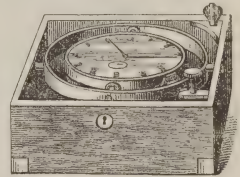


FIG. 14.—Chronometer.

so that, whatever angle the deck of the ship may form with the horizon, the chronometer will always maintain the same position, it becomes one of the most perfect pieces of mechanism.

Its great use is in making astronomical observations, and it is especially valuable in determining longitude at sea. The first experiment with a chronometer was made in 1665, in a voyage to the coast of Guinea, by Major Holmes, with a watch made by Huygens. With this the longitude of the island of Fogo was obtained with tolerable precision. In 1726 Mr. Harrison made a chronometer which was a marvel for correct timekeeping. In 1736 it was sent to Lisbon, and corrected the reckoning on the voyage as much as a degree and a half. He was paid £500 by the English government to prosecute further experiments, which resulted in his producing an instrument so accurate that it made an error of less than two minutes in a voyage to Jamaica and back, and in obtaining the reward of £20,000 which had been offered. It is not attempted to regulate chronometers to diurnal time, it being only necessary to ascertain their rate, when the correct time can be calculated.—The train of wheels, together with the lever and balance in a modern detached lever escapement, such as is now made in the best watch factories in the United States and in Europe, is represented in fig. 15. It is placed between two plates of brass, the under, called the pillar plate, being an entire circle, while the upper plate, which is removed in the figure, may be either one quarter, one half, three quarters, or a full plate. In many European watches the upper plate is almost entirely replaced by what are called bridges—pieces which are screwed to the pillar plate, and have arms which project far enough to receive the arbors of the wheels. The barrel *b*, which contains the main spring, has the great wheel placed around it, instead of being placed upon a fusee and driven by a chain wound upon the barrel as represented in fig. 9, and which is still the construction in most English watches. Of course the tension of the spring becomes less as it uncoils; but if the coil is of considerable length the variation need not be great, and by the nice adjustment of the balance is completely counteracted. One

pany at Boston, Mass.; the United States watch company at Marion, N. J.; the National watch company at Elgin, Ill.; the New York watch company at Springfield, Mass.; the Springfield watch company at Springfield, Ill.; and the Cornell Watch company at Grand Crossing, Ill. Watches made by this method possess the advantage of great accuracy at a comparatively small cost. All the parts in the train are made perfectly uniform, so that any particular wheel may be replaced without making any sensible variation in the running of the watch; and so of any other part. The small, fine-threaded screws which are used to hold some of the parts together are made in the most perfect manner and with wonderful rapidity by very ingenious machines, one of which is shown in fig. 17. A steel wire, *a*, is placed in

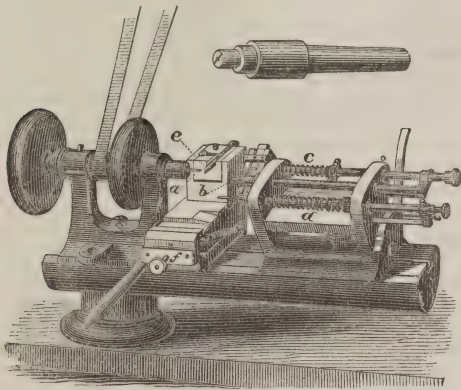


FIG. 17.—Screw Lathe.

the spindle and turned by the belt. A die, represented enlarged in the upper part of the cut, made in two sections and held in the end of a tool *b*, cuts the thread as it is pressed against the wire by a motion communicated by a lever. Previous to this, however, the wire is reduced to the precise length required by the tool *c*, which is adjusted by a gauge, and the stem of the screw is also turned down by the tool *d*. After the thread is cut, the tool *e* is brought against the wire, and the head of the screw is formed. There is an ingenious device

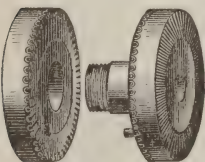


FIG. 18.—Slotting Disk.

for removing the screw, which is still attached to the wire by a small pedicle. It consists of two disks, represented in fig. 18, which when joined together form a series of tapped holes, made to fit the screws. One of these, being held against the point of the screw while it is revolving in the spindle, receives it, and when the end of the thread is reached the motion breaks off the pedicle, leaving the screw in the disk. When all the holes are filled, the disk is placed in an ingenious automatic machine which car-

ries, during proper periods of time, the head of each screw beneath a revolving saw which cuts the slot. A machine for cutting the teeth in wheels is shown in fig. 19. A tool called a quill, an enlarged view of which is presented

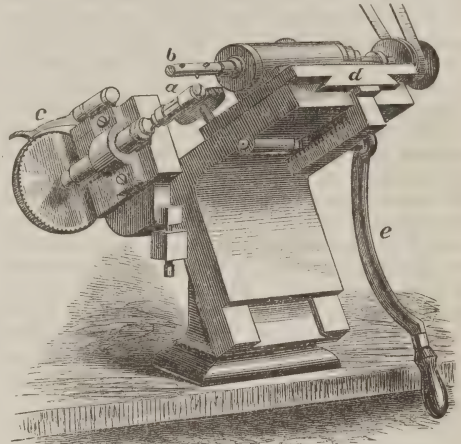


FIG. 19.—Lathe for Cutting Teeth.

in fig. 20, *a*, and which is divided into sections to receive the arms of the wheel, bearing upon its exterior the rim, is fed with from 20 to 40 wheels, the collection being called a stack. This quill is then placed upon a shaft which is turned by a graduated wheel having notches in its rim to correspond with the number of teeth in the wheel. This wheel is stopped at each notch by the click *c*, whereby the quill holding the stack of wheels is fixed, and in such a position

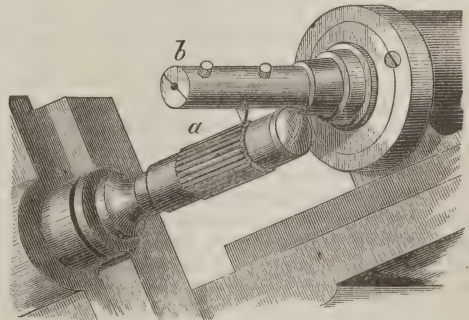


FIG. 20.—Enlarged View of Cutter.

respecting the tool which is carried by the arbor *b*, that a groove may be cut between two teeth in a radial direction, or any other which may be required. The arbor of the cutting tool is carried backward and forward by means of a slide *d*, worked by a lever *e*, by which means the tool is carried along the whole length of the stack of wheels, cutting a notch in each, and thereby forming the teeth. Club-tooth scape wheels require for their cutting several different forms of tools. These are

placed upon arbors which are made to revolve about a common centre, in the manner of a revolving firearm. Many other labor-saving machines are in use whereby great accuracy is attained at a comparatively small cost. The polishing of the leaves of pinions and the teeth of wheels, and the grinding of the faces of the pallet stones to their proper angles, are processes that are performed with much greater facility and accuracy by the use of machinery than by hand.—Most of the internal parts of clocks and watches, except the pinions and arbors, are usually made of brass, because of its ductility at ordinary temperatures. From its resemblance to gold it can be readily and cheaply covered with a frosting of gilt to protect it against corrosion. An alloy of nickel is used instead of brass in many of the Swiss and American watches, which in being finished passes through a process called damaskeen-ing, by which wavy lines resembling those on Damascus swords are produced on the surface. Dials for watches, and also for clocks, are made by fusing enamel upon a thoroughly cleaned disk of copper, and then grinding down the surface evenly upon a stone, after which it is again subjected to enough heat to glaze it. The required circles are then inscribed upon it, and the proper divisions are made for the figures, which are painted on with a pencil in black porcelain paint and burned in.—Geneva, Neuchâtel, Chaux-de-Fonds, and Locle, in Switzerland, are the chief seats of watch manufacture, particularly for exportation, in Europe; but watches are made at several places in Germany and France. Liverpool has long been celebrated for timekeepers, and most of the English watches for exportation are made there.

CLODIUS PULCHER, Publius, a Roman demagogue, killed in 52 B. C. He was by birth a Claudius, but changed his patrician name to Clodius in order to curry favor with the plebeians. He served in Asia under Lucullus, in whose camp at Nisibis he acted the part of a mutineer, and was afterward taken captive by the pirates of Cilicia. On his release he joined the Syrians in their war against the Arabians. He led a scandalous life on his return to Rome, and was believed to have had an intrigue with the wife of Julius Cæsar, into whose house, while it was occupied by the vestals and matrons in the performance of the mysteries of the Bona Dea, during the celebration of which all males were rigorously excluded, he gained admission in the disguise of a woman. Cæsar, although he repudiated his wife on the ground that she must not even be suspected, gave evidence in favor of Clodius on his trial for the violation of the sacred mysteries. Cicero declined to defend him, and gave evidence against him. By bribing the judge, however, Clodius was acquitted. Supported by Cæsar, Pompey, and Crassus, he was elected tribune in 59, and used his power to drive Cicero into exile for one year, after which he was recalled to Rome, in spite of the opposition of Clodius.

He also managed to make Cato leave Rome, by sending him on a mission to Cyprus. Having degraded himself as a tool of the triumvirs, he aimed at the supreme power, rallied around him the worst characters of Rome, insulted Pompey, and after having taken every means to bring disgrace upon himself and upon Rome, he was finally murdered in an affray with his political rival Milo, a circumstance which has acquired great celebrity from Cicero's oration in defence of the murderer. The mob was infuriated at the death of their favorite, and Pompey was appointed sole consul to restore order. The first wife of Clodius was a sister of Lucullus, and his second the notorious Fulvia.

CLÆLIA, a Roman maiden, who according to the legend was one of the hostages delivered to Porsena when he withdrew from the Janiculum, terrified by the threats of C. Mucius Sævola. The story is that she swam across the Tiber and effected her escape, but was sent back to Porsena by the Romans. Porsena in admiration of her courage presented her with a horse richly caparisoned, and allowed her to make a selection from the other hostages and return with them to Rome. She chose those who were of tender age and most likely to suffer from captivity. An equestrian statue which stood in the *via sacra* at Rome was supposed to have been erected in her honor.

CLOCHER, a decayed episcopal town of Ireland, in county Tyrone, situated on the Laung, a tributary of the Blackwater, 80 m. N. W. of Dublin; pop. about 400. The Anglican see has lately been united to that of Armagh; the Roman Catholic bishop of Clogher resides at Carrickmacross. St. Patrick is said to have been the first bishop of Clogher, in 444.

CLOISSONNÉ. See supplement.

CLOISTER. See MONASTERY.

CLONFERT, one of the oldest Irish bishoprics, deriving its name from the convent of Clonfert or Clonefort, in the county and 42 m. E. of Galway, founded in the latter part of the 6th century by St. Brendan. The present residence of the Roman Catholic bishop is at Loughrea; the Anglican diocese has been united to that of Killaloe. Clonfert, formerly called a city, contains an ancient episcopal palace and cathedral and a few huts.

CLONMEL (Irish, vale of honey), a town and parliamentary borough of Ireland, in the counties of Waterford and Tipperary, on the Suir, 90 m. S. W. of Dublin, and 25 m. N. W. of Waterford; pop. in 1871, 9,484. It is finely situated in a picturesque valley, nearly shut in by mountains. Most of the town is built on the N. or Tipperary side of the river, which is crossed by three stone bridges. The main streets are handsome and well paved. Gas is generally used, and the supply of water is abundant. The best houses are of limestone quarried in the vicinity. There is a handsome new court house, a county jail, barracks for infantry and artillery, a military hospital, a club house, a fine parish church, a well endowed

grammar school founded in 1685, a lunatic asylum, workhouse, infirmary, fever hospital, dispensary, two orphan establishments, and other charitable institutions. It has a considerable trade in grain, cattle, butter, and bacon; the butter market is a commodious building. There are general fairs in May and November, and also special fairs every alternate month, chiefly for cattle. Clonmel is said to have been fortified by the Danes. It was taken by Cromwell in 1650, and the fortifications demolished.

CLOOTZ, Jean Baptiste, baron, known under the name of **ANACHARSIS CLOOTZ**, a French revolutionist, born near Cleves, Prussia, June 24, 1755, guillotined in Paris, March 24, 1794. He was educated in Paris, and his wealth permitted him to devote himself to his visionary schemes of social and political regeneration. Under the name of Anacharsis he visited Germany, England, Italy, and several other countries of Europe to preach philanthropical doctrines, the aim of which was to unite all nations in one brotherhood. When the French revolution broke out, he returned to Paris. He had already called himself the spokesman of the human race, and he now proceeded to officiate as its ambassador. Gathering around him as many specimens of the different foreign nationalities as he could find in Paris, he marched up with them to the national assembly, and delivered an address demanding for the foreigners in Paris the right of participating in the celebration of the anniversary of the taking of the Bastille. He showed the utmost devotion to the cause of the revolution, and contributed 12,000 livres for the public defence. After Aug. 10, 1792, he repaired to the legislative assembly, where he indulged in violent attacks against monarchy and religion, insisted upon a price being placed upon the heads of the duke of Brunswick and the king of Prussia, and finally offered to raise at his own expense a legion of Prussians. Created a French citizen by a decree of the legislative assembly, he was elected to the convention by the department of Oise, and became conspicuous by his eccentricity and his intense hatred of crowned heads. In spite of all this, he was suspected by Robespierre, who had no confidence in a rich and titled revolutionist. He caused Clootz to be expelled from the society of Jacobins, implicated him in the accusation of Hébert and his companions, and, although no evidence of his guilt could be produced, sentence of death was passed upon him. When brought to the place of execution, he asked to be beheaded the last, "in order," as he said, "to be able to verify certain principles, while he saw the heads of his companions fall." Calmly ascending the steps of the scaffold, he protested against his sentence, made a final appeal to the human race, and received the fatal blow with unflinching courage. He left some strange writings: *La certitude des preuves du Mahométisme, L'orateur du genre humain, et La république universelle.*

CLOQUET. I. Hippolyte, a French physician, born in Paris in 1787, died there, March 3, 1840. He was for 15 years the most distinguished private teacher of anatomy of his time, but fell into a state of complete mental debility. Among his works, long highly valued, are treatises on descriptive and on comparative anatomy, on odors and the sense of smell, &c. —His son **ERNEST** (1818-'55) was from 1846 physician to the shah of Persia, receiving the title of privy councillor, and was also accredited as minister of France at his court. **II. Jules Germain**, baron, a French physician, brother of Hippolyte, born in Paris, Dec. 18, 1790. He commenced the study of medicine at an early age, earned distinction in anatomy and surgery while very young, became one of the most eminent surgeons in the world, and was for many years professor of surgery in the faculty of Paris. Besides his great work on human anatomy (3 vols. large fol., with 240 plates, 1821-'31), he wrote numerous important works on hernia, on calculi and the diseases of the urinary organs, on the preparation and construction of skeletons, on the existence and disposition of a lachrymal apparatus in serpents, and on the anatomy of intestinal worms. Several of his dissertations obtained prizes from the academy of sciences and other learned societies. He invented many new surgical instruments, and several important methods of performing surgical operations. He also introduced improvements in the art of modelling anatomical preparations in wax; and many of his own exquisite preparations are preserved in the anatomical museum of the medical faculty of Paris. In 1831 he obtained by public competition the chair of clinical surgery of the faculty of Paris; in 1855 he succeeded Lallemand as member of the academy of sciences; in 1860 he was made commander of the legion of honor, and in 1867 a baron. Besides his professional works, he published *Souvenirs de la vie privée du général Lafayette.*

CLOSSE, Raphael Lambert, the great Indian fighter of colonial Canada, born at St. Denis de Mogres, near Tours, France, killed at Montreal, Feb. 6, 1662. He came out with Maisonneuve in 1642, and was made sergeant major of the garrison of Montreal, acting in time of peace as notary also. The exposed position of this settlement made his office one of importance, and he soon grasped the theory of Indian fighting. He trained his men as sharpshooters, and armed them with musket, pistol, and sword. Each was to pick his man, bring him down with a musket ball, then rush on and take another with a pistol, and then come to close quarters with the sword, taking to the cover of trees when possible. By these tactics, when he once set out with 20 men to rescue four who were besieged in a redoubt at Point St. Charles, though he lost four men at the first fire, he killed 32 with his survivors, and routed the hostile force. On July 26, 1651, with only 16 men, after a fight that

lasted all day, he routed a party that had penetrated to the Hôtel Dieu or hospital in Montreal. On Oct. 14, 1652, he engaged a force of 300 Iroquois near the fort, and, protecting his party of 34 by an old hut, routed the enemy completely, having killed 50 and wounded 37 of them, losing only one man killed and one wounded. In 1655 he acted as governor of Montreal, in the absence of Maisonneuve. On Feb. 6, 1662, he was sent out with 12 soldiers to rescue some workmen attacked by the Iroquois; but being deserted by his servant, and his pistols missing fire, he and three of his party were killed. He left a young widow, Elizabeth Moyen, who had been made an orphan by the Indians. The fief of St. Lambert had been granted to him in 1658 as a reward for his services, and in 1672 another was bestowed on his widow. As a mark of respect to him, St. Lambert street, Montreal, as well as his fief, were named after his patron saint.

CLOT, Antoine, popularly known as **CLOT BEY**, a French physician, born near Marseilles in April, 1795, died there in 1868. He studied at Montpellier, became a surgeon at the principal hospital of Marseilles, and in 1822 chief surgeon of the Egyptian army. At the instance of Mehemet Ali he founded at Abu-Zabel, near Cairo, a medical school and hospital, schools for the acquirement of the French language, for apothecaries and veterinary surgeons, and for midwives. In 1832 he received the title of bey, being the first Christian thus honored without being required to change his religion. In 1836 he was made chief physician of the general staff and director of the whole medical administration, with the rank of general. The institutions over which he presided were removed in 1837 to Cairo; and though he was opposed by native fanatics, who even sought to murder him, he effected many improvements in medical education and organization, and displayed great skill and devotion during the prevalence of the cholera. In 1849, after the death of Mehemet Ali, he returned to Marseilles, and presented his Egyptological collections to the French government. He wrote extensively on the cholera and the plague, and among his works are *Aperçu général sur l'Égypte* (2 vols., Paris, 1840) and *Méhémét-Ali, vice-roi d'Égypte* (Marseilles, 1862).

CLOTAIRE. I. King of the Franks, the youngest son of Clovis and Clotilda, born in 497, died in 561. On his father's death in 511 he received as his kingdom a part of Neustria, the capital of which was Soissons, while his brothers, Clodomir and Chilbert, were kings at Orleans and Paris, and the eastern part of the Frankish empire, Austrasia, was in the hands of Theodoric, the eldest son of Clovis. When Clodomir was killed in 531, Clotaire murdered two of his nephews to get possession of the kingdom of Orleans. His son Chramne having revolted against him, he ordered him to be burned alive with his wife and children. After the death of his brother

Chilbert, and of Theodoric's grandson, Clotaire found himself in possession of the whole Frankish empire. He reigned after this but three years; and on his death the empire was divided among his four sons, Charibert, Gontran, Chilperic, and Sigebert. He was buried in the church of St. Médard at Soissons. **II.** King of the Franks, born in 584, died in Paris in 628. He was only four months old when, at the death of his father Chilperic, his guardianship was assumed by his mother Fredegonda. A protracted and ferocious war broke out between her and her rival Brunehaut, who governed Austrasia and Burgundy in the name of her grandsons. After many vicissitudes, Brunehaut was delivered into his hands by the nobles of Burgundy in 613, and was put to death in the most barbarous manner, her grandsons being already dead. Thus Clotaire II., being the only surviving Merovingian prince, was proclaimed king of the whole empire founded by Clovis, and increased by the conquests of his sons. He was succeeded by his son Dagobert I.—Two other Merovingian princes of the same name bore the title of king: **CLOTAIRE III.**, in the 7th century, under the guardianship of Ebroin as mayor of the palace; and **CLOTAIRE IV.**, some 50 years later, under Charles Martel. Both were among the most obscure of the *rois fainéants*.

CLOTHO, the youngest of the three Parcae or Fates, daughter of Jupiter and Themis, or of Erebus and Night. Clotho held the distaff and spun the thread of life, whence her name Κλωθω, "I spin." She was represented wearing a crown with seven stars, and a many-colored robe.

CLOTILDA. I. Saint, the wife of the Frankish king Clovis, born about 475, died in Tours, June 3, 545. While an infant, her father, mother, and two brothers were murdered by her uncle Gundebald, king of the Burgundians, who spared her life on account of her extreme youth, and who even attended to her education. Her father had been an Arian; but she and her elder sister Chrona, who became a nun, were educated in the Roman Catholic faith of the mother, and Clotilda became a great favorite among the bishops of Gaul. Through their agency she was married to Clovis in 493, to whose conversion she greatly contributed. When the power of her husband was firmly established in the country north of the Loire, she incited him to attack the Burgundian king in order to avenge her father's death. Clovis yielded to her entreaties, but did not follow up the victory he had won near Langres, and was satisfied with making Gundebald his tributary. After the death of Clovis (511), however, the queen prevailed upon her three sons, Clodomir, Chilbert, and Clotaire, to renew the war against Sigismund, the son of the murderer. This unfortunate prince was taken prisoner, dragged to Orleans, and with his wife and children thrown into a well. The war in the mean time continued, and after a protracted struggle Clotilda had the satisfaction of seeing Burgundy

in the hands of her sons Childebart and Clo-taire. She spent the latter part of her life in Tours, near the tomb of St. Martin, became noted for her piety, founded several monas-teries and churches which acquired great celeb-erity, and was canonized by the church of Rome. According to her desire, she was buried in the church of Ste. Geneviève, Paris, built by Clovis. Saved from destruction during the revolution, her remains are now in the church of St. Leu, and a new church has been built in her honor. Her marble statue is in the Luxembourg.—See *Vie de Sainte Clotilde*, by Mme. de Renneval (2 vols., Paris, 1809). **II.** A daughter of the preceding, died in 531. Her husband, Amalaric, king of the Visigoths, ill-treated her, and she was insulted by the populace because she declined to become a convert to Arianism. Her brother Childebart, on receiving her veil stained with the blood of a wound inflicted upon her by her husband, invaded Amalaric's territory, despoiled the churches of Narbonne, and took her with him to Paris; but she died on the way.

CLOTILDE DE SURVILLE. See SURVILLE.

CLOUD, a N. county of Kansas, intersected by Republican and Solomon rivers; area, 720 sq. m.; pop. in 1870, 2,323. The chief productions in 1870 were 21,794 bushels of wheat, 76,105 of Indian corn, 4,735 of oats, 11,609 of potatoes, 3,224 tons of hay, and 25,871 lbs. of butter. There were 894 horses, 842 milch cows, 2,123 other cattle, 614 sheep, and 637 swine. Capital, Concordia.

CLOUDS, bodies of vapor in the atmosphere. From the surface of the earth and of the waters aqueous vapor is continually ascend-ing into the atmosphere, where it remains in an invisible state so long as the air is not satu-rated with moisture. Its capacity to retain this vapor is limited, but varies with its tem-perature; the greater the warmth, the more the particles of vapor are expanded and carried into higher regions. Cold condenses the par-ticles, their specific gravity is increased, and they appear in visible form. (See Dew.) Satu-rated to the utmost, the atmosphere cannot contain, it is estimated, more than 6 to 7 inches of water, diffused through it in an invisible state, at one time. But the diffusion of vapor is never uniform, and the temperature also varying in different portions of the atmos-phere, there ensues the greatest diversity in the conditions of the moisture contained in these portions. Where it is not too abundant for the existing temperature, it is all dissolved, and the appearance is presented of the clear, blue, invisible ether. Where the moisture is in excess for the temperature, it is seen in the form of clouds, thin and fleecy if the air is but slightly sursaturated, but dark and lowering if new accessions of moisture or reduction of temperature increase the difference between the moisture present and the capacity of the air to retain it. Thus the conditions are seen that cause frequent changes in the appearance

of the clouds; and it is understood how clouds filled with moisture, like those gathered by the Etesian winds as they sweep over the Mediter-ranean, are dispersed in thin air as they strike the hot rays reflected from the burning sands of Sahara; and how those similarly charged with moisture by the sweeping of the trade winds across the Atlantic shed this in copious showers as they strike the cold summits of the Cordilleras. The formation of a cloud by cold and its dispersion by heat are beautifully ex-hibited at the Table mountain, Cape of Good Hope. As the wind from the southern ocean strikes the rocky slopes of the mountain and is diverted upward into the colder regions of the atmosphere, a dense white cloud is evolved, which, reaching but little above the mountain, spreads over its summit and is carried down the other side. It marks the course of the wind, "plunging down with the violence of a cataract," as described by Sir John F. W. Her-schel, "clinging close to the mural precipices that form a kind of background to Cape Town, which it fills with dust and uproar." But as it reaches the warmer regions below, the mois-ture soon resumes its invisible state, and the cloud is only seen covering the mountain and hanging down its precipitous sides, suggesting the idea of a huge white cloth, whence its name of "table cloth." There is much differ-ence in the height of clouds. The mean height in winter may be stated as from 4,000 to 4,600 ft., and in summer from 10,000 to 14,000 ft.; but they often have greater altitudes. Gay-Lussac, when in a balloon at a height of 23,000 ft., observed cirrus clouds at a considerable distance above him. In Ethiopia M. d'Abadie saw storm clouds at a height of only 700 ft. above the earth. Dalton asserts that in small fleecy patches they have been seen at full five miles above the surface, sailing even over the highest summits of the Andes. But in cold regions the vapors are soon checked in their ascent by condensation. Wherever arrested, if the weather be calm, they settle down by their greater relative gravity, undergoing with change of position changes of form and ap-pearance, until they may be at last brought to the warmer airs below, and in these dissolving and disappearing, be again lifted into the colder strata to reassume the form of a cloud. Clouds are thus no permanent collections of the same particles of aqueous vapor, but spaces in the firmament in which successive portions of vapor in the atmosphere are continually pre-sented in visible form, to disappear and be re-placed by other portions. To account for the suspension of clouds various theories have been proposed. De Saussure considered the particles of vapor to be minute hollow vesicles filled with air, from $\frac{1}{45000}$ to $\frac{1}{28000}$ of an inch in diameter, and he has been supported by Halley, Kratzen-stein, and Brevais. One reason offered in favor of the vesicular theory is the fact that rainbows are not produced when the sun shines on clouds or steam, as it was thought they would if the

particles were globules of water; but Sir J. Herschel offers the explanation that the globules may be as minute as the lengths of light undulations, and would not therefore, by refraction or reflection, form the solar spectrum. It appears, moreover, that as long ago as 1847 ("Philosophical Transactions"), Dr. A. Waller disproved the existence of vesicles by projecting steam upon the surface of Canada balsam and examining the particles with a microscope, when it was found that they were not hollow. Assuming this to be a fact, the suspension of clouds in the air is not difficult of explanation when we reflect that, as Prof. Stokes has demonstrated, a globule of water $\frac{1}{1000}$ of an inch in diameter falls through the air with a velocity of only .067 of an inch per second, a motion which is inappreciable when compared to the upward movement which the air generally has in large clouds.—The various forms in which clouds present themselves are described after the nomenclature introduced by Mr. Luke Howard in the "Askesian Lectures," 1802 (published in vols. xvi. and xvii. of the "Philosophical Magazine"). He recognizes



FIG. 1.—Cumulus.

three primary modifications, the cumulus, stratus, and cirrus; and intermediate between these, into which they blend, three other forms, the cumulo-stratus, cirro-stratus, and cirro-cumulus; and lastly, the nimbus, resulting from the others confusedly intermixed.—The cumulus is the summer day cloud. About sunrise it is seen to collect by the gathering of the small specks of cloud, which are the scattered night mists, and which, accumulating, present the appearance of distant rounded hills covered with snow. In calm weather it is obviously formed from the columns of vapor that rise irregularly from the surface, invisible below, but brought into view above, as the particles reach the stratum of the atmosphere already at its dew point. There the vapors, arrested in their ascent, form piles of clouds of hemispherical shapes, the apparently flat bases of which mark the level where hygrometric saturation commences. As with the increasing warmth of the day more vapor is carried upward, these piles of clouds increase in height and density. They obscure the rays of the sun, by which, however, they may be dispersed before the decline of day, or

they may be gathered and condensed by cool winds, preparatory to returning their moisture to the earth in the form of rain.—The stratus is the cloud of night and of winter, though not limited to these periods any more than the cumulus is to that of the day. As the day cloud is produced by the ascending vapors, that of the night, called also the fall cloud, is, excepting fogs formed by exhalation, the result of their descent, their settling down in horizontal layers or strata. This form of cloud is



FIG. 2.—Stratus.

at times suddenly produced, overspreading the heavens in a few minutes, by the temperature of the air falling by radiation or by diminished atmospheric pressure. It falls to a lower level than other clouds, creeping along the valleys at night in the form of mists and fog, and vanishing with the return of day. In winter it continues as an overhanging cloud sometimes for several successive days. The smoke fogs are one form of the stratus; at night settling down to a lower level, as if each smoky particle by radiation of heat collected dew, and sunk by increase of weight.—The cirrus is a cloud



FIG. 3.—Cirrus.

of feathery form, and in wisps of diverging fibres. It extends in long slender filaments, and again in parallel stripes from one extremity of the heavens to the other. Its appearance often in flexuous fibres has caused the names of curl cloud and mare's tail to be applied to it. No clouds are seen so elevated as the cirri. From summits where one looks down upon the piles of cumuli, the fleecy cirri are seen floating as far off apparently in the blue ether as when

observed from the base of the mountains. Their great elevation and feathery form suggest that the vapor exists in snowy flakes, and this is rendered more probable by the occurrence of those phenomena due to reflection and refraction, as halos, parhelia, &c., most usually in these clouds and the cirro-cumulus. Traces of halos, such as are produced by the refraction of light from frozen particles, may almost always be discovered in them by careful examination with the aid of a blackened mirror. The long filamentous forms of cirrus are evidently connected with the action of currents in the air, maintaining uniform temperature along their lines, and drawing out in these shapes the residues of dissolving clouds. Variations in these currents of temperature or direction impress new forms upon the cirri. In diverging fibres, which is the true cirrus form, the cloud is supposed to indicate changeable weather, in summer rain and wind, in winter frost or snow; if the fibres have for some time continued to point in one direction, a gale of wind is looked for from that quarter.—The cirro-cumulus is often produced by the cirrus descending to a lower level in the atmosphere, and its parallel bands breaking up into the shape of small cumuli. It also appears independently of the previous existence of cirri. It floats at a high elevation, being often seen in the light of the moon through the scud and drift of the lower clouds, looking not unlike a flock at rest. Its spotted appearance has caused it to be commonly known as the "mackerel sky."—The cirro-stratus is characterized by its arrangement in long parallel lines of cloud in close proximity, straight or waving, and lying in horizontal strata. It is also seen in a long and narrow horizontal sheet, tapering toward its extremities. The name of wane cloud has been given to it, from the fibres of the cirrus waning or subsiding to produce it. Its prevalence indicates wind, rain, or snow. In the form of rows of little clouds curved in a peculiar manner, it is called the cymoid cirro-stratus, and is regarded as a sure indication of approaching storms. When seen as a thin hazy veil spreading over the sky, particularly toward night, and obscuring the sun and moon, it is one of the most certain signs of approaching rain or snow. Virgil, in the *Georgics*, notices this obscuration of the sun behind a cloud soon after its rise, as sure to be followed by rain. The refractions of the light of the sun and moon, producing halos and mock suns, often appear in this cloud.—The cumulo-stratus is formed by the passing of the cumulus into the nimbus, or rain cloud, though before the latter is perfected the cloud may be dispersed by evaporation, or turn back to the cumulus. It is also called the twain cloud, from the fact that two or more cumuli are often seen to join together to produce it. A single one is also sometimes observed to spread out laterally at top, till it overhangs the base in irregularly shaped protuberances. Such masses gather to-

gether, presenting a most imposing spectacle, as a thunder storm is approaching. The marginal protuberances are then seen, often shining with a strong silvery or golden light, contrasting finely with the darkness and density of the central portions of the cloud. Upon these the cirrus or cirro-stratus is sometimes formed by currents of air, causing the upper portion of the cloud to assume the curly forms of this variety, or spreading its long line horizontally across the summit.—The nimbus is that stage of cloud from which the rain falls. It usually proceeds from the cumulo-stratus, which grows darker and denser, till its blackness and threatening aspect can no longer be mistaken as a sure sign of impending rain. The blackness gives place to a gray obscurity, an evidence of a change in the disposition of the aqueous particles, and the rain falls from the cloud, which is now a nimbus. The presence of its aqueous drops gives it the distinction among clouds of being the field upon which are displayed the beautiful colors of the rainbow. The nimbus having discharged its moisture, the various forms of cloud are again seen in their several places in the sky; the cirrus in some of its



FIG. 4.—Nimbus.

modifications in the upper regions, while the fragments of the nimbus are converted into thin cumuli, which are borne along by the light winds near the surface. But if these gather again into the form of cumulo-strati, rain is likely to return.—The nomenclature of Howard is generally adopted by meteorologists. Prof. Loomis objects to the introduction of the nimbus as a distinct form, considering that it does not differ from some of the other varieties, except in the fall of rain, which is not sufficient to give it a peculiar character; for clouds do not always undergo a decided change as rain begins to fall. He remarks upon the occurrence, familiar to all who have lived in the vicinity of the great lakes, of a sheet of cloud continuing during a large part of the winter season to overcast the sky, from which snow is frequently emitted for days in succession, without change or apparent motion in the cloud itself. This variety, including all clouds which cover the heavens with a nearly uniform and unbroken sheet, he places in the division stratus, thus supplying a deficiency in the European

classification, at least in its adaptation to American meteorology. ("Journal of Science," vol. xli., p. 325.)—Prof. André Poëy, late director of the observatory at Havana, published a memoir in the report of the Smithsonian institution for 1870, in which he proposes a new classification, which includes only two classes or types in place of the three of Howard, rejecting the stratus on the ground that it is some other form viewed in perspective, or is no proper cloud, but a mist or hoar frost. The following tables show the comparison of the two classifications:

NOMENCLATURE OF HOWARD.

First type.....	Cirrus.
Derivatives.....	{ Cirro-stratus. Cirro-cumulus.
Second type.....	Cumulus.
Derivative.....	Cumulo-stratus.
Third type.....	Stratus.
Derived from other types.....	Nimbus.

NEW NOMENCLATURE OF POËY.

First type.....	Cirrus.	
Derivatives.....	{ Cirro-stratus. Cirro-cumulus. Pallio-cirrus.	{ Snow clouds.
Second type.....	Cumulus.	
Derivatives.....	{ Pallio-cumulus. Fracto-cumulus.	{ Vapor clouds.

Prof. Poëy's principal reasons for making this classification are stated by himself as follows: "When certain clouds spread out uniformly over the whole face of the heavens and assume a gray or ash color, under which state rain may occur for hours or whole days, what name do we give them? They are not Howard's nimbus, as we conceive them and as they are generally described; they are neither stormy nor electrical; they yield only a fine and continuous rain. Under this stratum we see constantly other clouds of more or less extent, but always isolated, becoming lost in it and increasing its thickness. But just before this stratum begins to break up, and during this operation, we see these same formless fragments detach themselves and fly to other regions. This inferior stratum is not alone; for when its disruption is completed we see through it another stratum of clouds, whiter and less dense, which breaks up in its turn, and ends by disappearing in an opposite direction to that of the inferior stratum. Have we a name for this variety of cloud, so common in time of rain from the intertropical regions to higher latitudes, especially in winter during the fall of snow? Does Howard's term nimbus and his description of it answer for its designation? Certainly not. We apply the name nimbus to the single storm cloud as well as to this inferior stratum, or to the united strata, and this without electrical manifestations. To this cloud I give the name of pallium. When the superior stratum is formed of cirrus, it constitutes the pallio-cirrus; and when the inferior stratum is formed of cumulus, it constitutes the pallio-cumulus. The fragments of clouds which differ entirely from the cumulus or cumulo-

stratus are the fracto-cumulus." Whether Prof. Poëy's classification is well founded time will decide. The propriety of rejecting the third class or type of Howard, the stratus, is rather questionable in the light of the opinions held by Prof. Loomis, some of which have been quoted, and also when we take into consideration the use Prof. Poëy himself makes of the word stratum in the explanation of his theory. The name fracto-cumulus appears to be applicable to some forms of cloud not otherwise clearly denominated, such as we often see at sunset; but the placing of the gray vapor cloud, which Prof. Poëy calls pallium, in the third division, stratus, by Prof. Loomis, would seem to supply the deficiency in Howard's classification with as near an approach to accuracy as the subject is perhaps capable of admitting.—An interesting feature in the phenomena of clouds is their gathering in the equatorial regions in a vast belt, which encircles the globe, and continues permanent and of nearly uniform breadth. This belt covers the region of equatorial calms, or the "doldrums," and vibrates with this, as the seasons change, from one side of the equator to the other, its range being from lat. 5° S. to lat. 15° N. It has been observed of various widths, ranging from 60 to several hundred miles. The cloud belt is produced by the vapors gathered up and brought in by the N. E. and S. E. trade winds from each side of the equator, and diverted in the belt of calms, where they meet, into the upper regions of the atmosphere. There, continually fed by new supplies from below of heated air saturated with moisture, the cloud spreads in one vast body over several degrees of latitude, passing even beyond the margin of the calms, seeing that its rains stretch out on each side into the region of the trade winds. Borne upward into the cooler strata of the atmosphere, the heated airs shed their moisture, which falls in frequent torrents of rain. But immense volumes of vapor upon the upper surface of the cloud, exposed in the heat of the day to the direct rays of the sun, are retained in an invisible state, and thus are wafted away to reappear as clouds, and precipitate their waters upon distant portions of the earth. This cloud belt serves another important purpose in protecting the torrid region it overshadows from the scorching heat of the sun; which, if continued without interruption, would in one season render the equatorial belt a barren, uninhabitable waste. It is the N. and S. vibration of the cloud ring that causes the fluctuations of the rainy seasons on the parallels of latitude within its range. When it has swung near to its extreme polar limit, the sky about the equator is clear, and the crust of the earth then begins to grow hot. "The dry season continues, the sun is vertical, and finally the earth becomes parched and dry; the heat accumulates faster than the air can carry it away; the plants begin to wither and the animals to perish. Then comes the mitigating

cloud ring. The burning rays of the sun are intercepted by it. The place for the absorption and reflection, and the delivery to the atmosphere of the solar heat, is changed; it is transferred from the upper surface of the earth to the upper surface of the clouds." Clouds are thus not merely the gatherers and distributors of rain to all parts of the earth, but they are a curtain spread before the sun to intercept its fierce heat, and check at night the too rapid evaporation from the soil heated during the day by its rays. Where they are not formed, and the surface is exposed to the sun, there we infer that water cannot be present, and the ground must be a parched desert. Such appears to be the condition of the side of the moon presented to the earth, no clouds ever being seen to obscure its disk. It has been shown by Tyndall that invisible vapor also has the power of absorbing radiant heat, and thus, by intercepting the fierce rays of the sun during the day, or the radiation of heat from the earth at night, of preventing, in atmospheres supplied with moisture, those great changes in temperature which take place in arid tropical regions. (See "Contributions to Molecular Physics in the Domain of Radiant Heat," New York, 1873.)—Little is known of the causes that produce the brilliant and varied colors often assumed by the sky, particularly at sunset. They are unquestionably, however, connected with the aqueous vapor contained in the atmosphere; and the reddish hue, the most common of all, is probably owing to the greater facility with which these rays are transmitted through the watery vesicles. Reflected from the surface of distant hills, they even give to these a delicate roseate hue.—The electricity of the clouds is a subject for more especial reference in the articles ELECTRICITY and LIGHTNING. Aqueous vapor being a better conductor of electricity than the dry air, the heavy clouds gather this force from the atmosphere around, some strata being positively and some negatively electrified. When separated by comparatively dry atmosphere, these clouds, or the clouds and the earth, are in the condition of a Leyden jar, ready to be discharged with sudden report when the non-conductor which separates them is broken through. As the clouds thicken and the watery particles more nearly approach each other, the electricity contained in the whole cloud gathers upon its surface, and at last acquiring sufficient tension to break through the non-conducting medium, the electrical equilibrium is established with the flash of lightning and the roar of thunder. The electrical condition of the clouds has been referred to as the cause of their being often gathered around the summits and sides of mountains, as if they were attracted to these, as light floating substances when electrified rush toward bodies in their vicinity. But the phenomena explained in the early part of this article show that the low temperature prevailing in these localities is sufficient to account

for the continual formation of a cloud, causing it to appear permanent, when it is but a process of condensation of new vapors brought on by the winds replacing those which are swept away and rendered invisible, as they dissolve in the warmer airs at a distance.

CLOUGH, Arthur Hugh, an English author, born in Liverpool, Jan. 1, 1819, died in Florence, Italy, Nov. 13, 1861. He was educated at Rugby school, and at Balliol and Oriel colleges, Oxford. In 1842 he gained a fellowship at Oriel, which he resigned in 1848, because his theological opinions did not accord with those of the established church. In 1848-'9 he travelled on the continent. He was in Rome, where he was intimate with the leading Italian liberals, during the siege of that city by the French. Upon his return to England he was made principal of University hall, and professor of the English language and literature in University college, London. In 1852 he resigned this appointment, came to America, settled at Cambridge, Mass., and engaged in teaching and literary pursuits. The next year he returned to England to accept a position under the committee on education. After the close of the Crimean war he was appointed secretary to a commission to examine the military systems of the continent. At the time of his death he was travelling for the benefit of his health. His chief work, a poem in hexameters entitled "The Bothie of Tober-na-Vuolich," was published in 1848. In 1858 the "Amours de Voyage," a story in verse, appeared in the "Atlantic Monthly." He revised Dryden's translation of "Plutarch's Lives" (Boston, 1859), and just before his death wrote "Mari Magno," a series of tales. A collection of his poems, with a memoir by Charles Eliot Norton, appeared in Boston in 1862.

CLOVER (*trifolium*), a genus of plants belonging to the natural order *leguminosæ*, comprising 59 species, and generically distinguished as tufted or diffuse herbs, with flowers in heads or spikes, leaves mostly palmately trifoliate, a persistent 5-cleft calyx, the standard of the corolla longer than the wings, small 1-6-seeded pods, and stipules joined with the petioles. From the three leaflets which constitute its leaf it takes the name *τρίφυλλον* in Greek, *trifolium* in Latin, and trefoil in English.—There are several of the many varieties of clover of great value to agriculturists. Red clover (*T. pratense*) is a biennial plant, having perennial qualities under special modes of cultivation, and is particularly adapted to argillaceous soils. Small clover, or the rowen crop, is excellent for young stock; but animals should not be permitted to feed on clover lands in early spring or late in the autumn; in the latter case the crop is likely to be winter-killed for want of a mulch-like protection, and in the former is not able to regain full vigor during the after part of the season, and this is especially true if sheep are the pasturing stock. Land may be seeded down to clover with any of the cereal

crops, such as wheat, barley, rye, oats, and in special cases with buckwheat. It is very desirable that the seed should be sown sufficiently early to receive the full benefit of the spring rains. The dung of cattle fed on clover hay is often sufficient to seed land, if distributed evenly through the soil, the seed generally passing through the animal organism without having its germinating qualities impaired. The proportion of seed to be sown with timothy or



Red Clover (*Trifolium pratense*). a. Pod. b. Seed.

other grass seeds must necessarily vary with the results desired. In order to secure even distribution, it should be sown in calm weather. Standing on one ridge while sowing on another, as is sometimes done, on a windy day, is unfavorable to good work. In dry weather, and on clayey soil, it is well to bush-harrow in order to insure full covering, and occasional rolling is very desirable. Every farmer should have plenty of clover for soiling in early spring for his working animals. After each cutting during the season, top-dress heavily with manures. Land becomes "clover sick" only in the absence of a proper succession of crops, and the elements of fertility necessary for the support of the plant. Many farmers have great faith in the power of clover, when ploughed in, to restore fertility to exhausted soils. It does so only by taking carbon from the atmosphere, and causing elements in the soil to assume organic forms, thus rendering them more available as food for other crops, and is therefore very necessary in a rational system of husbandry; but if a soil be almost robbed of its fertility by excessive cropping, its equilibrium must be restored by adding deficient elements. Land is often too poor for the seed "to take." In this case it should be summer-fallowed, manured, sowed to winter grain, and to clover in the spring. Prof. Way found in 100 parts of the ash of clover, grown on a silicious sand, phosphoric acid 5.82, lime 35.02, potash 18.44, soda 2.79, sulphuric acid 3.91. As indicated by

analytic research, plaster of Paris, which is sulphate of lime, the phosphates, wood ashes, and muck treated with the salt and lime mixture, are excellent top-dressings for clover. The use of plaster, sometimes called gypsum, is often of great value for top-dressing, even in the immediate vicinity of plaster beds. The practice of ploughing in a clover crop preparatory to the growing of wheat is of much importance. There is a great similarity between the composition of the ashes of wheat and clover, especially if the latter be grown on soil replete with the necessary constituents. Analytical research has shown that the composition of clover or any other plant varies with the chemical condition of a soil. Clover crops should therefore be raised on soils containing sufficient pabulum, and in an available condition for their support. The growing of clover is equal to deep ploughing, because its long roots travel deeply in search of food for the stems and leaves, which if ploughed into the land will undergo decomposition, and leave near the surface elements taken from the subsoil. Its leaves take carbonic acid largely from the atmosphere, and the ploughing in of the crop augments the carbon of a soil very materially, which changes its color, and gives it greater capacity to absorb solar heat and to retain manures and ammonia, whether resulting from their decomposition or absorbed from the atmosphere. It is very doubtful whether in all cases clover is the most economical mode of furnishing carbon. If time be worth much, it is not, because an immediate application in most cases may be made of muck treated with the salt and lime mixture, black mould from the woods, peat, river deposits, &c.—Clover fields are sometimes infested by vegetable parasites of well developed structure, producing seed. The small broom (*orobanche minor*) is one of these. Its flowers are of a pale brownish color. Microscopic examinations show that when it infests clover there is an organic connection between the plants. This parasite is interesting to the agriculturist, not for its utility but for its mischief. The dodder (*cuscuta*) is another of these depredators, belonging to the family of the *convolvulaceæ*, having small flowers resembling those of the convolvulus. It bears perfect seed, which is shed upon the soil, and there germinates, pervading the ground by a wire-like process, doomed to a lingering death unless it finds a clover plant. In the commencement of its growth it gets its nourishment from the soil, but afterward from the juices of the plant which it infests. The dodder will find the object of its destruction if within reach, and its papillæ or peg-like processes, although delicate in structure, will sink into the stalk and feed upon the juices of the clover plant.—The crimson clover (*T. incarnatum*) is now raised for soiling and hay, and is a beautiful Italian plant, sometimes cultivated as a border flower. Much attention is given to its cultivation at present in Scotland.

Fulton's experiments in growing crimson clover attracted special attention from the members of the Highland agricultural society. A large crop was raised from seed sown by Mr. Fulton on land from which a crop of early potatoes had just been taken. Three months after it was sown, on Oct. 17, the yield was 2½ tons per imperial acre. He arrived at the following conclusions: It is highly valuable as a secondary crop after early potatoes; it is an excellent intermediate crop to precede turnips; it will withstand severe weather if well established before frost; it produces an excellent crop of forage, much relished by live stock. If the land is not very clean, it will not answer so well as vetches, but it is of easy cultivation. Maturing 10 or 12 weeks after sowing, it may be produced very early in the season if wanted for stock.—White clover (*T. repens*) is an excellent plant on all pasture lands, of great value in sheep husbandry, adapted to almost every kind of soil, and its network of roots is



White Clover (*Trifolium repens*).

all through the soil.—The following analyses of red and white clovers are by Prof. Way of the royal agricultural society of England:

	Red Clover.	White Clover.
Water.....	81.01	79.71
Albuminous or flesh-forming principles.....	4.27	3.80
Fatty matters.....	.69	.89
Heat-producing principles—starch, gum, sugar, &c.....	8.45	8.14
Woody fibre.....	3.76	5.33
Mineral matter or ash.....	1.82	2.08
	100.00	100.00

One hundred parts of each of the varieties named, dried at 212° F., gave the following results:

	Red Clover.	White Clover.
Albuminous or flesh-forming principles.....	22.55	18.76
Fatty matters.....	3.67	4.33
Heat-producing principles—starch, sugar, gum, &c.....	44.47	40.04
Woody fibre.....	19.75	26.53
Mineral matter or ash.....	9.56	10.29
	100.00	100.00

These researches of Prof. Way are most valuable contributions to the science and art of agriculture. Boussingault found the nutritive equivalent of red clover hay, taking English hay as the standard, to be as 79 is to 100; the difference of result obtained by Fresenius in a like experiment need only be looked at. Thaer, a most careful experimenter, found its practical value in feeding to bear the same relation to English hay as 90 to 100. He found the nutritive equivalent of red clover in the green state to be as 311 to 100, and its practical value in feeding to be 450 to 100.—If clover for hay is left till very ripe without cutting, the starch and sugar of the plant will change to woody fibre, thus causing brittleness if much exposed, and rendering the hay almost valueless. The nectaries of clover heads, when fully developed, are rich in a honey-like liquid, hunted for by bees, and if the crop is mown before the seed ripens this saccharine property will be preserved. In growing seed, it is common to pasture the first year's growth, or cut a crop of hay, and leave the second growth for seed; but if the cutting is not done early, the frost may check its growth, thus preventing its maturity. After threshing, it is run through a hulling machine, and then a fanning mill. Clover is much more succulent than any of the grasses usually raised for hay, requiring more time to part with its moisture, and should be cut only when free from dew. If dried by a hot sun, it heats in the sward, wilts, becomes dark-colored, and loses flavor and aroma. It should be saved in the cock, and only so much mown at one time as can easily be brought under cover if rain threatens. Make no hand or rake rolls; use forks; any unnecessary compression breaks the structure of the plant, and makes the sap exude. The usual application of salt at the time of putting it in the mow is beneficial. In special cases the mixing of clover hay with straw or other fodder of the previous season is desirable, especially if it be not thoroughly dried. Green clover hay imparts flavor, aroma, and freshness to old fodder, thus causing animals to relish the mixture.

CLOVES, a celebrated spice of the Molucca islands, so called from the resemblance to small nails, and designated in all countries wherever known and used by a term having this signification (Port. *cravos*, Span. *clavos*, from Lat. *clavus*, a nail). The clove of commerce is the product of the largest and most elegant of the myrtle family, the *caryophyllus aromaticus* of Linnaeus, and is described by Rumpf, in his *Hortus Amboynensis*, as "the most beautiful, the most elegant, and the most precious of all known trees." In its native soil, which is confined to the islets Ternate, Tidore, Mortir, Makian, and Batshian, on the west of Gilolo, the true and original Moluccas, this tree grows to a height of 40 ft., begins to bear the spice blooms in its seventh year, and attains to an age varying between 100 and 200 years. The trunk is perfectly straight, the bark smooth and of a light

olive color; about half the height the branches spring out horizontally and thickly, diminishing in length as they ascend, so that the compact mass of foliage, composed of slender laurel-shaped leaves, forms a perfect cone, supported by a clean straight stem. The spice is not the fruit, as is very commonly supposed, but the blossom, which is gathered before it is quite unfolded, when it resembles a closed-up convolvulus bloom. About a dozen of these blooms form a terminal cluster at the extremity of each twig and branch of the tree. The stem of the spice is the calyx, and the head the unblown corolla of these aromatic flower buds. The best season for collection in the Moluccas is in December; they are gathered quickly and carefully, and speedily dried in the shade before they have an opportunity to exhale the strength of their aroma.—When the Portuguese and Spaniards first visited the Moluccas, and when Magalhaens's ship, the Victo-



Clove.

ria, took on board at Tidore, in 1521, the first cargo of spices that was brought to Europe, the Molucca islands were cultivated by a numerous, enterprising, and industrious population, for the almost exclusive production of their great staple. Malacca was the chief emporium of the trade in cloves, from whence they were carried by various transits to every part of the then civilized world. The Portuguese held the spice islands for 93 years, restricting the culture, and preventing the free exportation of the article. When the Dutch drove the Portuguese from the Moluccas in the beginning of the 17th century, they established the clove culture in Amboyna, where it had been partially introduced by the natives prior to the Portuguese conquest. Then commenced the process of extirpation of every clove tree that grew upon the islands which were their natural home. Every year an expedition was sent to Ternate, Tidore, Mortir, Makian, and Batshian, to cut down every clove bush which

migratory birds might chance to plant in the native soil; and every native was punished with death who was known to plant a clove tree or sell one pound of its spice blossoms. When the forests were destroyed, the fertile volcanic soil was washed away by tropic rains and burned up by a tropic sun; the land became barren, and the people, who had lost their trade and their subsistence, perished of starvation at home, or as slaves in the plantations of Amboyna. Not only were the clove trees of the other Molucca islands destroyed, but also a large portion of the product of Amboyna was annually burned, in order to enhance the value of what remained in the hands of the monopolists. These annual burnings were continued till 1824. The clove tree in Amboyna falls far short in duration and productiveness when compared with the tree in its native region. In Amboyna it does not begin to bear spice till its 15th year, and its duration is not more than 70 years. It is raised still less advantageously at other points where its culture has been introduced, at Bencoolen in Sumatra, in the Straits settlements, at Zanzibar, and in the French islands of Réunion (formerly Bourbon) and Cayenne. The three varieties mentioned in commerce are those of Amboyna, Bourbon, and Cayenne. The clove thus far has defied all efforts, skill, and care to rear it in the same perfection to which it attains in its native soil. It requires tropic heat, a mountain declivity, with loose, dry, volcanic soil, and a frequent overshadowing of vapory clouds; all of which circumstances are only found combined in the Moluccas.—Cloves are sometimes used in substance as a stimulant to the digestive organs, but the oil is usually employed, chiefly as a corrigent to medicines. It may be used, in the same way as creosote or carbolic acid, to relieve the pain of a carious tooth. Oil of cloves is useful in microscopy for rendering transparent thin sections of tissues which have been soaked in alcohol. Nitric acid gives with oil of cloves a deep red color, similar to that produced by the action of the same reagent on morphia. In the latter case, however, but not in the former, the red is followed by a yellow. A tablespoonful of the infusion of cloves, given every hour or two, will sometimes relieve the vomiting of pregnancy; but it should not be administered if any inflammation of the stomach is present. The pungent sensation in the mouth produced by chewing cloves is strong enough to obliterate momentarily the taste. Advantage may be taken of this action in the administration of disagreeable medicine. For instance, the taste of cod liver oil will not be recognized if swallowed directly after chewing cloves.

CLOVIS, the founder of the Frankish monarchy, born at Tournai about 465, died in Paris in 511. On the death of his father Childeric (481), Clovis, then about 15 years old, was proclaimed king by the Salian tribe, then established around Tournai. Their territory was

small, and the Salian warriors were few in number; nevertheless within 30 years Clovis had secured for himself a powerful empire. On his accession Rome had been for five years in the hands of Odoacer, who had overturned the imperial throne; but the central part of Gaul was still governed by a Roman officer, named Syagrius, who was conquered by Clovis in the vicinity of Soissons (486), and fled to the Visigothic court at Toulouse; but upon the menaces of Clovis he was given up, and afterward put to death. The whole Belgic country, the cities of Soissons, Rheims, Troyes, Beauvais, and Amiens, submitted to the victor, who rapidly extended his dominion from the Scheldt to the Loire. He thus became one of the most powerful princes in Gaul, and was courted by the Catholic bishops of that country, who saw in him the future supporter of their faith, and succeeded in giving him as a wife Clotilda, the only Catholic princess in Gaul. At first she found him reluctant to renounce the worship of his national god, and it is narrated that a miracle was required to overcome his resistance to Christianity. The Alemanni had crossed the Rhine, and, following in the footsteps of the Franks, intended to settle in the rich plains of Gaul. Clovis hastened to repel them, and in a battle near Tolbiac (496) they were already raising the shout of victory, when Clovis in despair thought of the God of his wife, and throwing himself on his knees, exclaimed: "God of Clotilda, give me assistance in this hour of necessity, and I confess thy name." The course of victory was immediately turned; the Alemanni fled, while the flower of their forces and their king were killed. Within the same year Clovis, true to his vow, was baptized at Rheims by Bishop Remy, and with him 3,000 of his companions. In a short time this example was followed by the greater part of the nation. Henceforth Clovis became popular among the Catholics in Gaul, all the bishops of that communion, impelled by their opposition to the Arians, representing him as the deliverer of the faithful. Yielding to the entreaties of his wife (see CLOTILDA), Clovis invaded Burgundy, conquered Gundebald near Langres, and took several important cities, but finally contented himself with laying a tribute on the Burgundian kingdom. In 507, having summoned his warriors to the banks of the Loire, he thus addressed them: "I am displeased with those Arians possessing that beautiful country of Aquitania; let us go there and take it at once, for the land is very good." He then crossed the Loire and fell upon the Gothic army near Poitiers. The Visigoths were routed, their king Alaric was slain, and the greater part of Aquitania submitted to Clovis. Theodoric, the king of the Ostrogoths, however, succeeded in retaining Septimania. Clovis was then the sovereign of the whole country from the lower Rhine to the Pyrenees, bounded E. by the Vosges and the Cévennes, with the exception of several small districts

in the north still belonging to Frankish princes of his own family, some of whom had assisted him in his wars. But by the most treacherous and cruel means he got rid of these petty rivals, and became the only monarch of his race. He died soon afterward, and was buried in the basilica of the Holy Apostles, which had been built by him and Clotilda. He left four sons, among whom he had divided his dominions. Theodoric, the eldest, born to him by a first wife or mistress, probably of German descent, obtained the eastern country bounded by the Rhine and the Meuse, with the western part of Germany and some provinces in Aquitania; Childebert, Clodomir, and Clotaire, sons of Clotilda, were kings at Paris, Orleans, and Soissons, the last finally uniting under his power the dominions of his brothers.—Two other Merovingian princes of the same name, Clovis II. and Clovis III., lived in the 7th century; but they were mere tools in the hands of powerful mayors of the palace, and belong to that succession of Frankish kings known as the *rois fainéants*.

CLOWES, John, an English clergyman, born at Manchester, Oct. 31, 1743, died at Leamington, May 29, 1831. He was a fellow of Trinity college, Cambridge, and in 1769 was made rector of St. John's church, Manchester. Having become in 1773 one of the first English disciples of Swedenborg, he was thenceforward earnest in promoting his doctrines, although he retained his rectorship for nearly 60 years. He translated Swedenborg's *Arcana Cælestia* and other works, and published "Restoration of Pure Religion," two volumes of sermons, &c.

CLOWES, William, an English printer, born at Chichester, Jan. 1, 1779, died Jan. 26, 1847. His father was a schoolmaster, who died leaving his family in straitened circumstances. The son, after receiving a fair education, was apprenticed to a printer in his native town. In 1802 he went to London, worked for a year as a compositor, and then commenced business on his own account in a small way. Having married the cousin of a stationer who had much government business, he soon obtained considerable official work, and in a few years found himself at the head of a large printing establishment. In 1823 he commenced the use of steam presses, and the process, being a new one, excited much attention. In a few years his establishment grew into the largest printing office then existing, comprising 24 steam presses and 28 hand presses, and employing 600 persons. Upon the establishment of the "Penny Magazine," and subsequently of the "Penny Cyclopædia," he undertook the printing and publication of them, which he executed for 14 years with unvarying promptness, meanwhile extending his operations as a printer in other directions. He was among the first printers to have fonts of type so large that an entire work could be set up without distributing the type, so that in case of need he could execute 1,000 pages a week, or keep

a whole volume standing to await the author's final revision, thus often having tons of type standing out of use. The establishment which he founded is still among the largest in England, printing much for the great publishers.

CLOYNE, a market town of Ireland, in the county and 15 m. S. E. of Cork; pop. in 1871, 1,434. The cathedral, built in the 13th century, contains monuments of Bishops Warburton and Woodward, and near it is a remarkable round tower, more than 90 ft. high. The bishopric is said to have been founded in the 7th century by St. Colman, and the abbey in 707. In the 15th century the see was united with that of Cork, but it became independent again in 1678. Among the celebrated bishops of Cloyne were Berkeley and the astronomer Brinkley, who died in 1835, when the see was reunited with that of Cork. There are valuable quarries in the vicinity.

CLUB, a word of Saxon derivation, signifying a society of persons united for political, social, scientific, artistic, or literary ends, or for purposes of recreation. Clubs differ from mere associations in having some social bond, such as a place of meeting where the members associate in friendly personal intercourse. The modern English club differs considerably from those of two centuries since, which last better answered Johnson's definition of "an assembly of good fellows, meeting under certain conditions." Such was Ben Jonson's club at the "Devil Tavern." Political clubs came into existence at a later period. The King's Head club was a famous political association during the reign of Charles II. Clubs became numerous in England in the early part of the 18th century. The Brothers' club, of which Bolingbroke, Harley, and Swift were members; the Hanoverian club; the Beefsteak club, presided over by Peg Woffington, the actress; and the Kit-cat club, flourished in this era. In 1735 was established the second Beefsteak club, which has embraced among its members the most eminent public men. The Literary club, established in 1764, by Johnson, Boswell, Reynolds, Goldsmith, Burke, and others, is still flourishing. The club of the Friends of the People was established in London in 1793, for political purposes, by Lord Grey. From England the designation "political clubs" spread to similar organizations in France and other countries. They were prohibited in Germany in 1793. In France they were the focus of the revolution. The first French society that took the name of club was the *club politique*, established at Paris in 1782; a second was organized in 1785 under the name of the *club de Boston* or *des Américains*; and afterward the appellation of club was adopted by most political societies. The most celebrated clubs of the revolutionary period were the *clubs des Jacobins*, *des Feuillants*, *des Bretons*, *des Cordeliers*, *de Montrouge*, and *des enragés*. Clubs for social, literary, artistic, and political purposes are now found in every large city in the civilized world.

CLUB-FOOT, a deformity arising from rigidity and contraction of the muscles of the leg, in which the individual walks, with one or both legs, on the toes, on the external or internal border of the foot, or in some rare forms on the heel or the top of the foot. This deformity, which may be congenital or accidental, was known to Hippocrates; Celsus gave the names *varus* and *valgus*, which are still used, to two of the varieties; but the true anatomical history of the affection may be dated from 1803, when Scarpa published his memoir on the subject. In the simplest form, called *talipes equinus*, the heel is so raised that the person walks on the ball of the foot; this may vary from an elevation of an inch or two to a perfect continuation of the axis of the leg with that of the foot; it may be complicated with distortion inward or outward, and, in old cases, with permanent flexion of the leg on the thigh from contraction of the hamstring muscles. In *talipes varus*, which is the most common, the distortion is more complex; the heel is raised, the inner edge of the foot is drawn upward, and the whole foot is twisted inward, so that the person walks on the outer edge, and in extreme cases on the top of the foot and the outer ankle. In this form the limb is small, the muscles of the calf being feebly developed; the toes arranged vertically, the great toe uppermost; the sole of the foot very concave, and the back very convex; the external ankle turned backward, and very near the ground, the internal high up and approaching the heel bone; a callus on the outer edge which corresponds to the sole. Walking is difficult and fatiguing, and the standing position insecure; when existing in both limbs, the feet must be constantly crossed over each other in walking; from the inward rotation of the limb the knee is turned outward, which increases the difficulty of standing and walking firmly. The joints are generally movable; the tendo Achillis is tense, shortened, and turned inward with the heel. In new-born children the foot can be brought into the natural position, and in them *varus* is almost always combined with some degree of the first variety; indeed, the two are usually combined, giving a great number of intermediate forms. In *talipes valgus* the characters are the opposite of *varus*; the outer edge of the foot is raised up, and the person walks on the inner ankle and metatarsal bone of the great toe; the foot is strongly turned outward, as is the heel; the internal border is convex and the external concave; in this variety walking and standing are still more difficult and fatiguing. An extreme degree of *varus* has been described by Duval, in which the dorsum or back of the foot touches the ground; in its first stage the foot rests on the dorsal surface of the great toe, the other toes being rolled inward toward the sole; in the second, the deviation begins further back, and the metatarsus is bent at a right angle toward the sole; and in the worst form the whole anterior part of the foot is turned back, the dorsum

resting on the ground and the sole turned upward. This is usually congenital, and accompanied by deformity and stiffness in the other joints of the limbs, and depends on contraction of the flexors of the toes and the muscles of the calf. A fifth form is described, in which the toes are turned upward, the dorsum of the foot approaching the anterior surface of the leg, and the person walking on the heel. Club-foot consists essentially in a contraction, rigidity, and atrophy of the muscles of the calf, the deformity taking place in whichever direction the muscular equilibrium is the most easily disturbed.—Various causes have been assigned for congenital club-foot, such as vicious positions of the fetus, and mental and physical affections of the maternal system, such as are generally supposed to cause arrests of development. Convulsive diseases in infancy often cause permanent contraction of the muscles and consequent club-foot. Before the time of Scarpa it was supposed that there was in club-foot a dislocation of the bones of the tarsus and metatarsus; he maintained that there was rather a torsion of the scaphoid, cuboid, and os calcis, which would carry with them in the same direction the rest of the foot. The deformity may depend on an abnormal conformation of the astragalus and cuboid bones, with deviation of the anterior bones, this being especially the case in congenital club-foot; and in some rare forms there may be dislocation of the astragalus, though in most cases this bone preserves its normal relations to the tibio-tarsal articulation. In *varus*, the scaphoid and cuboid and heel bones are rotated outward, and the ligaments which bind the last two are generally relaxed; in congenital cases all the bones are small and the muscles wasted, and the limb is cold and feeble, indicating imperfect nutrition and innervation; the tibialis anticus and posticus, the flexors of the toes, and the muscles of the calf, being stronger than the peroneal muscles, increase the torsion as age advances, and the tense tendo Achillis draws the tuberosity of the os calcis obliquely upward. In *talipes equinus* the astragalus is more or less dislocated forward, and may be felt under the skin at the top of the instep; when the foot is rolled backward, the bones of the tarsus are more or less separated on their dorsal surface, and the joints below are proportionally approximated; the dorsal ligaments are thin and elongated, while those of the sole are shortened and thickened. In *valgus*, the deviations of the tarsal bones are the opposites of those in *varus*.—In children the prognosis is more favorable than in adults, on account of the flexibility of the muscles and the suppleness of the joints. Until the latter part of the last century the only means employed for the treatment of club-foot were various kinds of bandages and apparatus for extension; these were inconvenient, painful, expensive, requiring years of trial, and useless except in the simplest cases and in early childhood. The indications for

treating club-foot are fulfilled by the division of the tendo Achillis, or any other contracted tendon or tense fascia, and an apparatus for extending the foot at right angles with the leg. The tendo Achillis had been for many years frequently divided in veterinary practice, but was not interfered with in man for the cure of club-foot until about the year 1782; though an acknowledged operation in surgery, it was not practised in France until 1816, when Delpech performed it with indifferent success; it had become almost forgotten when Stromeyer revived it in 1831; since that time the operation has become improved and simplified, and the apparatus for extension rendered efficient by Duval, Bouvier, Guérin, Roux, and the best surgeons of Europe and America. Tenotomy, as the operation is called, has been performed at all ages, from a few weeks to 50 years, and has been applied not only to the tendo Achillis, but to the flexors of the toes, the plantar fascia, and any of the tendons surrounding the ankle joint which seem to aid in producing the deformity. The operation is so simple, so free from pain, so easily performed, so little liable to unfavorable consequences, and generally so speedily efficacious, that it seems unpardonable, unless in a few exceptional cases, for a surgeon to submit his patient to the plaster moulds, starched bandages, and other immovable apparatus of the old method. The divided tendon heals by a callus, which, when recent, may be extended to any desired length; the wasted antagonist muscles, being relieved from tension, gradually recover their power. At first the knife was passed under the tendon, piercing the skin largely on both sides of the limb, and extension was not applied until the fifth week, when the divided ends had contracted adhesions and lessened the chance of a favorable result. Stromeyer improved upon this by making a single puncture of small size, and by putting on the apparatus in the course of the second week. The tenotome is generally blunt-pointed, the skin being pierced by a lancet; it is introduced on the inner side of the limb, and is made to cut the tendon, previously put upon the stretch, from before backward, or toward the skin, without wounding the latter; this subcutaneous operation is painless, bloodless, and, from the exclusion of air from the wound, not liable to be followed by inflammation; extension should be applied as soon as it can be done, without causing too much pain.

CLUNY, or **Clugny**, a town of France, in the department of Saône-et-Loire, 12 m. N. W. of Mâcon; pop. in 1866, 4,253. It has several churches and schools, manufactures, a government stud, and some trade in cattle, horses, timber, and grain. The town sprang up around a Benedictine abbey, founded in the 10th century, which in the 11th and 12th centuries acquired great celebrity. Popes Gregory VII., Urban II., and Pascal II. had all been inmates of this abbey, which was inhabited at one time by

10,000 monks, and controlled over 600 religious houses. The most illustrious of the abbots was Pierre Maurice, or Pierre de Montboissier, known as Peter the Venerable, who gave an asylum to Abélard, and after his death befriended Héloïse. Subsequently the abbey declined, and in 1562 it was partly ruined by the Huguenots. In 1789 the monks were expelled, and in 1792 their famous basilica, once the finest church connected with a monastery, was plundered by revolutionary troops, and the building itself was sold at auction and pulled down. Only two towers of it remain, with fragments of the south transept, the Bourbon chapel, and some walls. Its library was one of the most renowned in France. A normal school for training special teachers for lyceums and colleges was established in 1865 in the remaining parts of the ancient abbey. The annual prizes and medals are awarded in a grove which is said to have been planted by Abélard. —The Cluny museum of national antiquities (*musée de l'hôtel de Cluny*) in Paris derives its name from one of the abbots of Cluny, who in the 14th century built the palace of Cluny for the use of his order; but the abbots did not often reside there, and gave the use of it to princes and cardinals. In 1790 it was confiscated and sold. The city of Paris purchased it in 1842, and presented it to the government, together with the ruins of a Roman palace belonging to it and called *Thermes de Julien*.

CLUSERET, Gustave Paul, a French soldier, born in Paris, June 13, 1823. In 1841 he entered the military school of St. Cyr, and two years afterward was appointed sub-lieutenant. In April, 1848, he was made a major in the *garde mobile*, and took part in suppressing the insurrection of June. In 1849 he was retired on half pay, and opened a painter's studio. In 1851 he reëntered the army as lieutenant in the *chasseurs à pied* of Algeria. In the Crimea (1855) he was wounded and promoted to a captaincy. In 1856 he joined the expedition against the Kabyles, and was named chevalier of the legion of honor. He resigned his commission in 1858, and in 1860 became attached to the staff of Garibaldi, was placed in command of the French legion, and in November received the brevet rank of colonel. In 1862 he came to America, entered the Union service, was attached to the staff of Gen. McClellan, and afterward served under Fremont in Virginia. In October, 1862, he was made brigadier general of volunteers. After some further service in the valley of the Shenandoah, he retired from the army, and in 1864 edited the "New Nation," a weekly journal in New York, which advocated Fremont for president and vehemently opposed the renomination of Lincoln. He returned to France in 1867, but was expelled in 1869 for publications against the transcontinental railway project in the United States, in which some prominent French officials were interested. He was subsequently for some time in New York, but re-

turned to Europe during the Franco-German war in 1870. In Paris he affiliated himself with the assailants of the government of national defence, but soon after left the capital and engaged in insurrectionary attempts in Lyons and Marseilles, which proved abortive. In the following spring he became minister of war in Paris under the commune, and for a short time was at the head of military operations, but fell under suspicion of treachery to the cause and was for a time confined in the Mazas prison. After the downfall of the commune he succeeded in escaping to Switzerland. Sentence of death was passed against him in his absence in the summer of 1872. He has since resided near Geneva.

CLUSIUM (the modern *Chiusi*), one of the twelve cities of the ancient Etruscan confederation, situated on the right bank of the Clanis, near a small lake to which it gave name, and 83 m. N. N. W. of Rome. Virgil mentions it among the cities which assisted Æneas against Turnus. Its original name is said to have been Camars. Under the rule of Porsena, about 500 B. C., it espoused the cause of the Tarquins, and in conjunction with other Etruscan states laid siege to Rome, which is supposed by modern critics to have surrendered, and submitted to humiliating conditions of peace. But the final issue of the war seems to have been unfavorable to the Etruscans, though how or when is not certainly known. During the later wars of the Romans with the Etruscans we hear of the Clusians only once, and then in conjunction with the Perusians, who were enemies of Rome. At what time Clusium passed under the dominion of the Romans is unknown. In 295 B. C. a Roman legion stationed at Clusium was cut to pieces by the Gauls. The latter in their third great invasion, 225 B. C., appeared under the walls of Clusium shortly before their decisive defeat at Telamon. In the second Punic war Clusium was under Roman rule, and furnished Scipio with corn and timber for his fleet. In the civil wars of Sulla and Marius the Clusians sided with the partisans of Marius, who were twice defeated near the city. Under the empire Clusium seems to have received a fresh colony of citizens, who enjoyed separate rights, and are mentioned as *Clusii novi*, in distinction from the *Clusii veteres*. But few remains exist of the former greatness of the city. (See CHIUSI.)

CLUVERIUS, or **Cluver, Philipp**, a German geographer, born in Dantzic in 1580, died in Leyden in 1623. His father destined him for the law, but withdrew his support on his devoting himself at Leyden to the study of geography and history under the direction of Scaliger. He enlisted as a private in the imperial army, and was imprisoned in Bohemia for translating into Latin a paper which was obnoxious to the government. After his release, his mother secretly supplied him with money, and he resided some time in England, and travelled through Scotland, France, Ger-

many, and Italy. At Oxford he made the acquaintance of Drs. Holland and Prideaux, and the latter procured him offers of promotion. But he returned to Leyden, where the university gave him an annual stipend. His *Introductio in Universam Geographiam tam Veterem quam Novam* (Leyden, 1629; best ed., Amsterdam, 1729; translated into German, 1733), was regarded as the first attempt at a comprehensive system of geography. Among his other works are archæological descriptions of Italy (edited by Daniel Heinsius, 2 vols., Leyden, 1623), of Sicily, Sardinia, and Corsica, (Leyden, 1619, and Wolfenbüttel, 1659), and *Germania Antiqua* (Leyden, 1616 and 1631).

CLYDE, the most important river of Scotland, rises in the southern part of Lanarkshire, out of the northern declivities of the chain of hills which may be regarded as a part of the Cheviots, dividing Lanarkshire, Peeblesshire, Selkirkshire, and Roxburghshire from Dumfriesshire. It runs principally in a N. W. direction, passing by Lanark, Hamilton, Bothwell, Rutherglen, Glasgow (which is the head of ship navigation), and Renfrew, and falls into the great estuary known as the frith of Clyde, formed by the concurrence of its own waters with those of Loch Long, coming down from the northward. This large river mouth, or arm of the sea, extends southward between the isles of Bute and Arran, which divide it on the west from Loch Fyne and Kilbrennan sound, and the shores of Renfrewshire and Ayrshire; off the latter it enters the Irish sea, between the mull of Cantyre and Kirkcolm point in Wigtonshire, nearly opposite Tor point, the extreme N. E. promontory of Ireland. The total length of the Clyde, from its source to the S. point of Bute island, is about 115 m. Its valley is one of the most interesting and the richest in old historic and legendary lore, as well as in agricultural and commercial wealth, of all the beautiful vales of Scotland. Its magnificent falls of Corra Linn and Stonebyres have been described by the most eloquent writers, and its banks are the scene of Scott's "Old Mortality." The valley of the Clyde is famous for a peculiar race of strong black cart horses, known as the Clydesdale breed. Commercially, the embouchure of the Clyde monopolizes the American, West Indian, and South American trade, besides attracting to itself a large portion of the Indian and Australian commerce. This is the more remarkable, since the Clyde is for the most part, as a navigable river, an artificial stream. Formerly a shallow, rapid river, obstructed by sand banks, it has been converted into a fine, uninterrupted, easily navigated avenue for ships of large burden, up to the splendid wharves of the great city which has grown up on its banks. The Forth and Clyde canal, which enters the latter river a little way below Kilpatrick, some 10 m. lower down the river than Glasgow, connects it with Borrowstounness on the Forth, about 30 m. above

Leith, and affords a perfect communication between the E. and W. coasts. It was commenced in 1777, and completed in 1790. Its total length is 35 m.; its greatest elevation, at its summit level, is 156 ft., which it reaches in 10½ m. by means of 20 locks, while on its descent to the western tide water, which it reaches at Bowling bay, it has 19 locks. When full, it can carry vessels drawing 8 ft. of water, and its locks have a length of 74 ft. and a width of 20. It was the earliest considerable Scottish work of the kind, and continues to be one of the most important, being the great connecting channel for the trade of the E. and W. coasts of the kingdom. There is also a branch to this canal, 2½ m. in length, terminating directly in Glasgow.

CLYDE, Lord. See CAMPBELL, Sir COLIN.

CLYMER, George, a signer of the declaration of independence, born in Philadelphia in 1739, died at Morrisville, Bucks co., Pa., Jan. 23, 1813. Left an orphan at the age of 7 years, he was adopted by his uncle, William Coleman, who educated him, brought him up to mercantile pursuits, and eventually left him the bulk of his fortune. His first appearance in public life was at a "tea meeting" in Philadelphia, Oct. 16, 1773, when he was made chairman of the committee to request the tea agents to resign, and soon after he was a member of the council of safety. He was one of the first two continental treasurers, from July 29, 1775, to Aug. 6, 1776, when he resigned. During his term of office he converted all his own specie into continental money, besides subscribing liberally to the loan. On July 20, 1776, with four others, he was appointed to succeed the members of the Pennsylvania delegation who had refused their assent to the declaration of independence; and, although he was not present when it was agreed upon, he and his associates signed that instrument. He was appointed with Stockton, Sept. 26, 1776, to visit Ticonderoga and inspect the northern army. When congress removed in December to Baltimore, he was appointed one of the commissioners to guard the public interests in Philadelphia. He was reelected to congress, March 12, 1777. On July 11 he was appointed one of the commissioners to inspect Washington's army. After the battle of Brandywine, Sept. 11, the British plundered and burned his country residence in Chester co., 25 m. from Philadelphia. On Dec. 11 he was appointed one of the commissioners to treat with hostile Indians, and to endeavor to suppress disaffection among some of the whites on the western frontier of the states. From November, 1780, to November, 1782, he sat for the third time in the continental congress. In 1780 he was deputed with John Nixon to organize the bank of North America, and in 1782 he was associated with Rutledge in a mission to persuade the southern states to contribute their quotas to the purposes of the war. In 1784 he was sent to the legislature, where he was influential in modifying the se-

verity of the criminal code; and in 1787 he was a member of the convention that framed the federal constitution. From 1789 to 1791 he was a member of congress; and in the latter year he was placed at the head of the excise department in Pennsylvania, and held the office till after the suppression of the whiskey riots, when he resigned. In 1796 he was one of the commissioners who successfully negotiated a treaty with the Cherokees and Creeks in Georgia, after which he retired from public life. He was the first president of the Philadelphia bank, of the academy of fine arts, and of the Philadelphia agricultural society on its reorganization in 1805, all of which offices he held till he died.

CLYTEMNESTRA, in Grecian legends, the daughter of Tyndareus, king of Sparta, and Leda. After her seduction by Jupiter, Leda, metamorphosed into a swan, is fabled to have laid two eggs, from one of which were produced Pollux and Helen, said to be the children of Jupiter, and from the other Castor and Clytemnestra, children of Tyndareus. Clytemnestra was given in marriage by her father to Agamemnon, and her sister Helen to Menelaus, both sons of Atreus, king of Mycenæ; the former of whom succeeded his own father on his throne, while the latter succeeded his father-in-law on that of Sparta. During the absence of Agamemnon in the war against Troy growing out of the abduction of Helen, Clytemnestra lived in adultery with Ægisthus. On her husband's return she slew him in a bath, and also his paramour Cassandra, in alleged retribution for the loss of her daughter Iphigenia. Clytemnestra and Ægisthus were afterward in their turn slain by Orestes, son of Agamemnon. The story of Clytemnestra has been a popular theme with dramatists; among those who have used it are Voltaire in *Oreste*, and Soumet in *Clytemnestre*. It is also the subject of one of Pierre Guérin's finest pictures.

CNIDUS, or **Cnidus**, the chief city of the Dorian hexapolis in Caria, built at the extremity of the peninsula of Triopium, partly on the mainland and partly on an island connected by a causeway, forming two harbors. It was founded by a Dorian colony from Lacedæmon, had an extensive commerce, and was visited by travellers from all the Grecian cities, attracted by the worship of Venus in the temple which contained the celebrated statue of this goddess by Praxiteles. There were also temples of Apollo and Neptune. It was off Cnidus that the Athenian Conon defeated with the Persian fleet that of the Spartans (394 B. C.), thus depriving them of the command of the sea. Ctesias, Eudoxus, and Sosttratus were natives of this city, of which considerable ruins are still visible near Cape Krio. The latest explorations of these ruins were by the archæologist Newton ("Travels and Discoveries in the Levant," 2 vols., London, 1865).

CNOSSES, or **Gnosus** (more anciently *Cnosus* or *Gnosus*, now *Makro Teikho*), the capital of

Crete in the time of Minos, built on the Cærat, a short distance from the northern coast, and founded by Dorians, who diffused their institutions over the island. Homer mentions it as already a great city, and the residence of the celebrated Cretan king; it long maintained its preponderance, until it was weakened by the growing importance of Cydonia and Gortyna. It was renowned in mythology by numerous legends of Jupiter, who was born and married in its vicinity, of Minos, Ariadne, the minotaur, and the celebrated labyrinth of Dædalus. In later times it became a colony of the Romans. Ænesidemus the Skeptic philosopher, and Chersiphron the architect of the temple of Diana in Ephesus, were born, and Epimenides flourished here. Some masses of Roman brickwork, parts of the so-called long wall, are the only vestiges of Cnosus.

COACH (Ger. *Kutsche*, Fr. *coche*, Hun. *kocsi* [formerly *kotsi*], probably derived from Kocs [Kots], the name of a village S. of the Danube, in which coaches were made in the 16th century), a covered four-wheeled carriage, and, as usually applied, limited to those employed as public conveyances for passengers. The vehicles designated by this name, slightly altered in the different European languages from the original Hungarian *kocsi*, have been so variously constructed, that the name may properly be treated as applicable to all covered carriages, including those used upon railroads. During the middle ages the only riding practised was on horseback; and when near the close of the 15th century carriages began again to appear, they were esteemed proper only for women and invalids. The emperor Frederick III., it is stated, came to attend the council at Frankfurt in 1474 in a close carriage, and the next year visited the same city in a very magnificent covered carriage. In the 16th century the German princes appear to have vied with each other in the number and splendor of their equipages. At the tournament in Ruppin in 1509, the electress of Brandenburg appeared in a carriage gilt all over; there were 12 other coaches there ornamented with crimson, and one of the duchess of Mecklenburg hung with red satin. The use of coaches, though prohibited to the feudal nobility and vassals by the orders and admonitions of the great lords, became popular throughout the states, and gradually extended to all the countries of Europe. The want of carriage roads, and the narrowness of the streets of many of the cities, were no doubt serious impediments to their introduction. Even as late as the 16th century people of the highest rank in France rode only on horseback, sometimes sitting behind their equerry on the same horse. Yet it would appear from an ordinance of Philip the Fair in 1294, forbidding citizens' wives to use carriages (*cars*), that they must have been known at that early time. About the year 1550 there were only three coaches in Paris. In 1610 Henry IV. was assassinated in his coach. The first

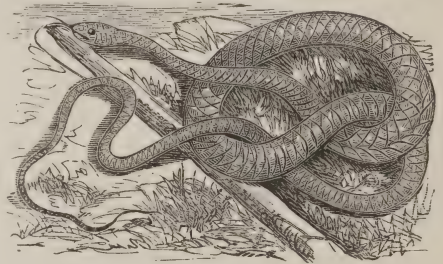
notice of coaches being suspended by straps is of that in which Louis XIV. made his public entrance about the middle of the 17th century. Carriages called whirlicotes were in limited use in England in the time of Richard II. His mother was conveyed in one on the flight of the royal family in the rebellion near the end of the 14th century. The introduction of coaches into England has been credited to Sir Thomas Chamberlayne, who was ambassador to the courts of Charles V., Philip II. of Spain, and the king of Sweden, and who, according to some, also introduced watches. But there is doubt on both points. Others say that Fitz-Allan, earl of Arundel, introduced coaches in 1555. Stow says that they were introduced in 1564 by a Dutchman, who became coachman to Queen Elizabeth. He adds: "After a while, divers great ladies, with as great jealousy of the queene's displeasure, made them coaches, and rid in them up and downe the countries, to the great admiration of all the beholders; but then by little and little they grew usual among the nobilitie, and others of sort, and within twentie years became a great trade of coach making." In 1619 the duke of Buckingham used one with six horses, and the earl of Northumberland, to ridicule this pomp, appeared in one with eight horses. The period in which coaches became familiar can therefore be referred but little further back than the time of the settlement of New England; and for a century afterward the use of private carriages in the country was limited to the aristocracy and wealthy classes. In London coaches began to be kept for hire in 1625. In 1673 there were 20 hackney coaches in Edinburgh, but the narrowness of the streets or state of the roads must have rendered them comparatively useless, for in 1752 there were only 14, and in 1778 only 9, while the number of sedans increased. The conveyances through the interior were the cumbersome stage wagons, used for carrying goods, in the tail of which, as it was called, was reserved a covered space for six or eight passengers, who sat upon the straw on the floor. In the reign of Charles II. stage-coach travelling was so poorly conducted, that two days were spent in going from London to Oxford, 58 miles; and in 1703, when Prince George of Denmark went from Windsor to Petworth, about 40 miles, to meet Charles of Austria, pretender to the throne of Spain, the journey occupied 14 hours, 6 of which were spent on the last 9 miles. The fact is spoken of by the historian as the more surprising, inasmuch as, except when overturned or stuck fast in the mire, his royal highness made no stop during the journey. In the middle of the 18th century the journey from London to Birmingham, 116 miles, occupied nearly three days by the stage coach; and the first regular public conveyance of the kind between London and Edinburgh was established in 1785, when "a two-end glass coach machine, hung on steel springs, exceeding light

and easy," was advertised to go through in 10 days in summer and 12 in winter, the passengers lying over the included Sabbath at one of the villages on the route. The modern mail coaches, running over splendid turnpike roads, making 10 miles an hour, and changing horses at every stage, were the finest in the world; but they have been superseded by the network of railways covering the country. At Amsterdam the use of wheel coaches was prohibited in 1663, on account of the injury they did to the expensive pavement; and the bodies were consequently placed on runners, as they are used in cold countries upon the snow.—Numerous forms of covered carriages have been introduced during the present century; too many indeed to be enumerated in this article. Hackney coaches drawn by two horses have generally given place in London to the one-horse cab or cabriolet, which came into use in 1823; but in the cities of the United States the former are altogether preferred. The long coach called an omnibus, with the entrance behind and seats along the sides facing each other, originated in Paris in 1827, and in 1831 it began to come into use in London. In large cities it is found the most economical form of carriage, except those running on rails, for conveying the largest number of passengers through the streets. In Paris the public omnibuses are numerous and commodious, though their progress is slow as compared with those of London. One company has a municipal monopoly and owns all the lines. The omnibuses on the several lines are of different colors, and the lines are lettered from A to Z, and from AB to AC. In 1872 there were in London about 1,500 omnibuses, employing nearly 7,000 persons. The number was formerly much larger in proportion, for in 1844 one company employed 1,400 omnibuses; but a large part of the city and suburban travel is now carried on tramways and underground railways. In New York city one was made in 1830, and run upon Broadway. In 1858 the number of these coaches employed upon various lines was 429. This was a considerable reduction from the number of former years, owing to the construction of horse railroads; and by 1873 the number was reduced to about 200. Before the introduction of railroads, post coaches were largely employed upon the public roads; and the demand for them in all sections of the country caused large establishments for their manufacture to grow up where the skill, capital, and materials required could be best secured. Active competition led to continual improvement, and the carriages became models of perfect construction, combining strength with lightness and gracefulness of form, together with comfort to the passengers, in a manner unequalled in any part of the world. They are made for carrying nine passengers upon three seats inside, two with the driver upon the "box" in front, and three upon a seat behind this on the front edge of the top. The manufacture of stage

coaches in New York, New Jersey, and New England has much decreased within a few years, but large numbers are still made, especially at Concord, N. H., for hotels, transfers, and for export to the far west and to Mexico and Central and South America. The French *diligences* are unwieldy vehicles, and only adapted for smooth roads. They are formed in three compartments, the front one called a *coupé*, having a seat for three persons facing forward; the middle apartment, the *intérieur*, has seats for six, like a hackney coach; and behind this is the *rotonde*, with seats for six or eight passengers, who sit with their backs to the sides of the carriage. On the front part of the top is the *banquette*, sometimes covered with a hood, with seats for four passengers. The driver rides one of the horses, of which five or six are commonly employed.—Few pieces of mechanical work require so great and varied skill as the construction of coaches. Their use demands lightness, and yet they must withstand the roughest service. They are to be subjected to continual strains and wrenchings, coming from every direction, exposed to all extremes of dryness and moisture, heat and cold, and used where repairs may be impracticable. The best materials are therefore selected and shaped with mathematical exactness. The frame is the nicest piece of joiner's work, made with the toughest ash, that has grown in exposed situations, and been hardened by a seasoning of two years or more. Oak and hickory, equally well prepared, are adapted for much of the work; and to the excellence of the latter wood may be referred some of the superior points of American coaches. The planking is of strong elm, and the panels of the light but stiff Spanish cedar. Mahogany and rosewood are also sometimes used; and for the same and other purposes, pine, bass, and lancewood. The frame, axles, &c., are thoroughly ironed with pieces of the best refined metal, made and fitted especially for this purpose, and often tested by severe strains. The springs require the best of steel. The leather employed is prepared for this particular use, and is of various kinds, from the heaviest harness leather to the fine enamelled and morocco for upholstery. Fine cloths, silks, damasks, plushes, &c., in great variety, are used for the lining; and an especial fabric called coach lace has long been a considerable article of manufacture in New England, for parts of the trimming and the holders. The preparation of many of these and other articles for the express purpose are subjects of distinct trades. Of all parts of the coach, none call for greater skill in their construction than the wheels. The spokes are placed to receive the whole weight and shock of the carriage, always in the direction to compress longitudinally the fibres of the wood, while no more of this is left to add to the weight than is necessary. The greatest ease of draught requires large wheels, but also that

the line of draught from the shoulder of the horse to the level of the centre of the forward axle should incline at an angle of 15° with the horizon. This limits the size of the forward wheels to from 40 to 44 in. in diameter, and requires that the horses should then work as closely as possible to the carriage. The hind wheels are from 50 to 56 in. in diameter, and the width of the track 4 ft. 8 or 4 ft. 10 in. The nave of the wheels is lined with a metallic box ingeniously contrived to exclude dust, secure the wheel from running off, and retain a supply of lubricating oil. For coaches designed for rough roads, leather straps are used to support the body, and these are secured to upright steel springs upon each axle. The painting of the body is probably a more elaborate process than is practised upon any other work. Three or four coats of priming in common oil color are successively applied, and after this as many more of white lead and yellow ochre for a body. The surface is afterward rubbed smooth with pumice stone and water, when it is ready for the selected colors and ornamental designs. Over these are laid several coats of copal varnish.

COACH-WHIP SNAKE (*psammophis flagelliformis*, Catesby; genus *masticophis*, B. and Gd.), an American species characterized by a



Coach-whip Snake.

long and narrow head, projecting upper jaw, superior orbital plates large and projecting much over the eyes; nostrils large, lateral, and near the end of the snout; eyes large, iris dark gray; neck small, body long, and tail attenuated like a whipcord, which it also resembles in the braided appearance produced by the arrangement and dark border of the scales. The scales are smooth and usually have two points at the apex; on the neck they are small, on the fore part of the body narrow and rhomboidal, on the tail short and broad. The color of the head, neck, and one-third of the body is glossy black, becoming paler toward the tail, which is tawny brown; the scales on the tail have dark margins; the lower surface in front is bluish slate, behind white clouded with brown; the colors vary in their shades, but near the head it is always black. In a specimen 61 in. long, and $2\frac{1}{4}$ in. in circumference, the head was $1\frac{1}{4}$ in., the body 44 in., and the tail 16 in.; the abdominal

plates were 203, and the sub-caudal scales 109 pairs. It sometimes attains the length of 7 ft. It moves with great swiftness, and feeds on young birds and small animals; though inoffensive to man, it defends itself bravely, twining its long folds around its enemy. This species is rare, and appears to be confined to South Carolina, Georgia, and Florida. In its general form, in the scales, and in the plates on the head, it somewhat resembles the black snake. It receives its popular name, not from the small size of the body and tail, but from the imbricated disposition of the caudal scales.

COAHOMA, a N. W. county of Mississippi, separated from Arkansas by the Mississippi river; area, 750 sq. m.; pop. in 1870, 7,144, of whom 5,381 were colored. The surface is low and level, and the western part is frequently inundated by the Mississippi. The Sunflower river flows through it, and Cold Water river through the N. part. The soil is generally good. The chief productions in 1870 were 151,985 bushels of Indian corn and 11,456 bales of cotton. There were 507 horses, 939 mules and asses, 1,184 milch cows, 2,688 other cattle, and 5,066 swine. Capital, Friar's Point.

COAHUILA, or *Cohahuila*, a state of Mexico, between lat. 24° 17' and 29° 43' N., and lon. 100° and 103° 30' W., bounded N. and N. E. by Texas, from which it is separated by the Rio Grande, E. by Tamaulipas and Nuevo Leon, S. by Zacatecas, and W. by Durango and Chihuahua; area, 58,920 sq. m.; pop. in 1869, about 96,000. The surface is rough, being intersected by several ranges of mountains which traverse it from N. W. to S. E. The only plain of any extent is in the W. part, and is called the Bolson (sack) de Mapimi, from the peculiar manner in which it is enclosed, having no opening excepting on the north. Several tribes of savage Indians overrun this plain, to the serious detriment of the farmers and miners. Villages and farms once prosperous have been abandoned in many instances by their inhabitants, as the only means of escaping their ferocity. A large part of the remainder of the state consists of rough mountainous country, and desert plains without wood or water; but there is much good grazing land, and except for the insecurity consequent upon the proximity of the savages, cattle might be extensively raised. In the Bolson de Mapimi are Lakes Mapimi or Caiman and Parras. The river Mapimi flows into the former, and the Rio Grande del Parras into the latter; both are small streams. The Salada, Sabinas, Toya, and Meteros, all affluents of the Rio Grande, are inconsiderable. Silver mines exist in the mountains, but few are worked on account of the lack of sufficient capital and hands, and the depredations of the Indians. The land adapted for tillage is limited, but when quietly possessed is well cultivated and yields abundantly. The chief cereals are maize, wheat, and barley. In the S. part the maguey (*agave Americana*) is cultivated in large plantations. Parras and its

vicinity are famous for their vineyards and the excellent quality of their wine. Brandy of high repute is also manufactured in considerable quantities. There are some large landholders in Coahuila, who would be very wealthy could their property be protected, but who are comparatively poor in the insecure condition of the country. The wines and liquors already mentioned, with coarse cloths and pottery, form the only manufactures; and the exports consist of wines, wheat and other grains, mules, horses, buffalo tongues, ox hides, deer skins and horns, wool, silver, iron, copper, amianthus, sulphur, and other minerals. Saltillo in the southeast, on the river Tigre, is the capital. Seven miles S. is the site of the battle of Buena Vista. (See BUENA VISTA.) The other principal towns are Monclova or Coahuila, Santa Rosa, and Parras.

COAITI, a South American mammal, formerly placed among the *viverridæ*, but now considered as coming near the raccoon, which it resembles in general appearance, habits, and diet. There are two species, the red and the brown, both remarkable for the great length and mobility of the snout; they live among the branches of trees, being very expert climbers, where they feed upon birds, and their young and eggs, on



Coaiti-mondi (*Nasua rufa*).

insects, and sometimes on vegetable substances. The red coaiti (*nasua rufa*) is of a general reddish chestnut color, with black ears and legs, maroon-colored bands on the tail, and white hairs on the edge of the upper jaw; the fur is harsh, and of little use; the paws are provided with peculiar tubercles, which give it firm foothold on the branches. It is a nocturnal animal, hiding by day; it may be tamed, though its temper is very capricious; the feet are 5-toed, with sharp claws. This species is often called "coaiti-mondi." It is smaller and more weasel-like than the raccoon. The brown coaiti, or quasehi (*N. narica*), is of a browner color, with the lower parts and inside of limbs tinged with yellowish gray. It is a lively and amusing animal, easily tamed, and useful as a destroyer of rats and mice in the

house, and of slugs and snails in the garden; it lives in the same region as the other species.

COAL, a black, opaque, inflammable substance, generally hard and compact, though laminated and stratified in beds between layers forming the crust of our earth. Coal has become one of the essential elements of modern civilization; in fact, the progress of the civilization of a country is now recorded by the amount of coal obtainable and employed by the inhabitants in a given time.—Mineral coal is a compound especially of carbon or of decomposed woody matter, with inflammable substances and hydrogen and oxygen gases. According to the different proportions of the volatile matter, in common language inaccurately called bitumen, the coal has a somewhat different aspect, flames more or less rapidly and actively, and develops heat in different degrees. These differences have served as a basis for a kind of classification of the coals, which, though scarcely limitable in its divisions, is generally admitted for common use. The more essential of these divisions are the following: 1. Anthracite or glance coal, a very hard, compact, lustrous, grayish black mineral, breaking in conchoidal fracture, though still bearing evidence of its original lamination. It burns slowly, with little or scarcely any flame, producing a high degree of heat. On account of the minute proportion of volatile matter in its composition, the coal is also called non-bituminous. When this coal is somewhat less dense, and has an increasing amount of volatile matter, it burns with more flame, and is then semi-anthracite. 2. Bituminous coal, though still hard, breaks more easily and more irregularly, often dividing into large cubic pieces in the plane of stratification and by cleavage. It is generally quite black, still with some lustre, contains less carbon with a larger proportion of inflammable substances than anthracite, and therefore takes fire more easily and rapidly, and burns with a bright yellow flame, developing less heat. The amount of volatile combustible matter in its composition is extremely variable, and therefore its appreciable characters, either in its value as a combustible material or in its appearance, vary in the same degree, considerably blending the classification and multiplying its names. With a moderate proportion of inflammable gases it is dry coal; with more bitumen it becomes fat coal, which passes to caking coal when in burning the matter soft-

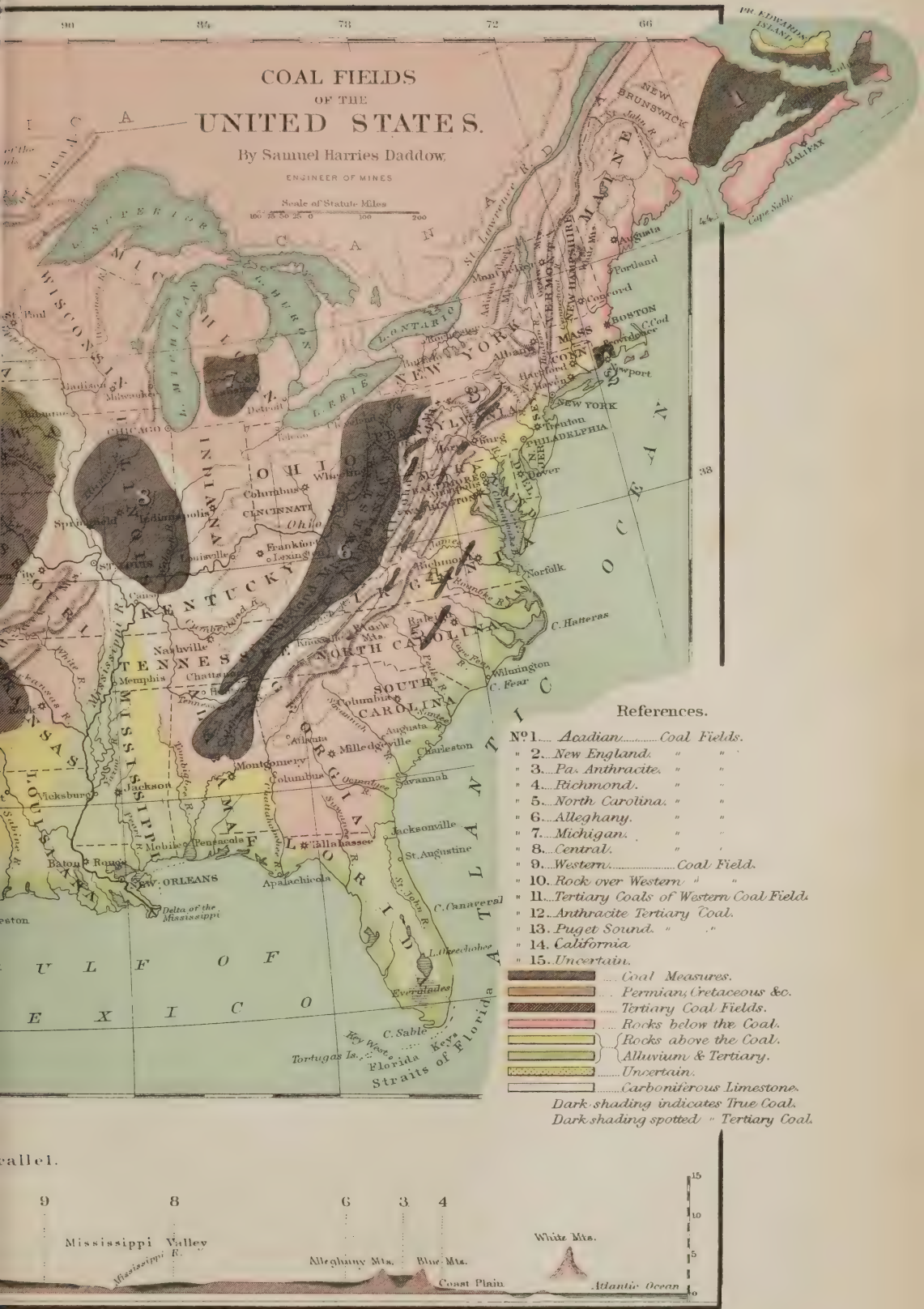
ens and coalesces like paste. Of the moderately bituminous coals, the best known in America is called semi-bituminous, of which very large quantities are produced from the Cumberland district of Maryland, and the Broad Top, Clearfield, and Blossburg districts of Pennsylvania, along the S. E. margin of the Alleghany coal field. Of the more highly bituminous coals the most valuable is the splint or block coal of N. W. Pennsylvania, Ohio, and Indiana, which owing to its peculiar structure can be used in its raw state in the blast furnace. 3. Cannel coal is also a kind of bituminous coal. It differs much from the numerous other varieties by its fine, equal, compact, homogeneous texture, resembling a dusky black paste hardened to a mineral substance or to stone. It breaks therefore with a conchoidal fracture, and is at once distinguished from the other kinds of bituminous coal by its equal, non-laminated structure, or the absence of those horizontal thin layers which in the common kinds of bituminous coal are seen alternating in different degrees of lustre and apparent density. By distillation it yields a larger proportion of mineral oil than any other coal. Sometimes it is so highly bituminous, as in the case of the Breckinridge coal in Kentucky, that it is dangerous to use it in steamboats, or in grates through which the oil percolates when inflamed. It burns like candles, and hence its name.—If the more marked characters which indicate the several species of mineral coal are easily recognized at first sight, and if everybody knows the bituminous coal from the anthracite or the cannel, it is not the less certain that, considering the matter in itself and in its compounds, coal is an indivisible whole. Not only have all the kinds of coal the same constituent chemical elements, merely varying in proportion in a slight degree, but all the varieties of coal, of bituminous especially, are found in some localities in the same vein. Anthracite passes to semi-anthracite, and this to bituminous coal, by inappreciable degrees. The coal beds of Shamokin and Trevorton in Pennsylvania give anthracite and semi-anthracite. The Spadra coal of Arkansas is semi-anthracite at one place and bituminous at another. In Kentucky some veins have one half of their thickness bituminous, the other half cannel; or at other localities, as for example on the Louisa river, the miners work bituminous laminated coal at one

ANALYTICAL TABLE OF MINERAL FUEL.

No.	NAME AND LOCALITY.	Density.	Free Carbon.	Total Carbon	Hydrogen.	Oxygen.	Water.	Ash.
1	Peat, general.....	.....	.....	28.09	5.98	30.37	30.05	5.62
2	Lignite, Rocky Mts.....	1.230	24.00	64.99	3.76	16.42	10.56	5.27
3	Anthracite, ".....	1.300	?	74.37	2.58	10.00	5.20	7.88
4	Cannel coal, W. Va.....	1.300	23.00	82.00	5.16	8.04	2.25	2.55
5	Block coal, Penn., W. Va., O., Ind.....	1.275	*30.00	82.92	6.09	10.00	2.00	1.49
6	{ Caking coal, general.....	{ 1.400	*15.00	85.90	5.46	5.00	2.00	1.64
7	{ Caking coal, rich gas.....	{ 1.350	25.00	84.00	6.00	5.00	3.00	2.00
8	Hard anthracite, Penn.....	1.550	?	94.00	.40	1.26	2.30	2.50
9	Soft anthracite, ".....	1.450	?	87.00	2.50	3.50	2.00	4.00
9	Dense anthracite, New England.....	1.780	80.00	10.00	10.00

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COAL FIELDS OF THE UNITED STATES.

By Samuel Harries Daddow
ENGINEER OF MINES

Scale of Statute Miles
100 20 25 0 100 200

References.

- Nº1. *Acadian*..... Coal Fields.
- " 2. *New England*. " " "
- " 3. *Pa. Anthracite*. " " "
- " 4. *Richmond*. " " "
- " 5. *North Carolina*. " " "
- " 6. *Alleghany*. " " "
- " 7. *Michigan*. " " "
- " 8. *Central*. " " "
- " 9. *Western*..... Coal Field.
- " 10. *Rock over Western* " " "
- " 11. *Tertiary Coals of Western Coal Field*.
- " 12. *Anthracite Tertiary Coal*.
- " 13. *Puget Sound*. " " "
- " 14. *California*.
- " 15. *Uncertain*.

- Coal Measures.
- Permian, Cretaceous &c.
- Tertiary Coal Fields.
- Rocks below the Coal.
- Rocks above the Coal.
- Alluvium & Tertiary.
- Uncertain.
- Carboniferous Limestone.

Dark shading indicates True Coal.
Dark shading spotted " Tertiary Coal.

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end of a gangway and cannel at the other, and this in the whole thickness of the bed. The analysis of caking coal fails to show any difference even in the proportion of the constituent elements from that of some kinds of dry or non-caking coal. Indeed, the character of the coal, where closely examined, is constantly variable in the same bed at the same mine, even upon the same square foot of matter, as recognized from specimens when taken at the same place from the roof to the bottom of the bank, although little or no difference is observed in a large quantity as it comes from the mine.—

ANALYSIS OF CANNEL COALS.

LOCALITY.	Sp. grav.	Volatile matter.	Fixed carbon.	Ash.
Albert coal, New Brunswick....	1.129	61.74	36.04	2.22
Boghead cannel (Scotch).....	....	66.35	30.88	2.77
Grayson, Ky., "jet cannel".....	....	61.95	30.07	7.98
" " " ".....	1.371	62.03	14.36	23.62
Breckenridge, Ky. cannel.....	1.150	64.30	27.16	8.48
Torbane hill cannel.....	1.189	67.11	10.52	21.00
Boghead black cannel.....	1.218	62.70	9.25	26.50
Boghead brown ".....	1.160	71.06	7.10	26.20
Hardie's (Scotch cannel).....	1.420	53.70	4.90	38.80

FORMULA OF THE GENERAL VARIETIES OF COAL.

Constituents.	Anthracite.	Caking coal.	Cherry or Block coal.	Splint coal.	Cannel coal.	Lignite.
Carbon.....	92.56	87.952	83.025	82.924	75.25	64.00
Hydrogen....	3.33	5.239	5.250	5.491	5.50	5.00
Nitrogen.....	?	?	?	?	1.61	?
Oxygen.....	2.53	3.806	8.566	8.847	19.83	26.00
Ash.....	1.58	1.393	1.549	1.128	2.81	4.00

In order to understand more easily the distribution of the combustible minerals, especially coal, it is convenient to have for reference a tabular section of the American geological divisions from the earliest times till now, as they have been recognized by science. The following brief review of the formations, from the lowest or oldest to those of our own time, has special reference to such evidence as they show of coal or any combustible mineral resembling it.—No trace of remains of either plants or animals has been positively recognized in the lowest formations of the earth, which, composed generally, at least, of crystalline metamorphic rocks, are considered as the result of the cooling of the surface of our planet, which was originally in a state of fusion or of vapor. The archæan rocks, also called primitive rocks, are therefore the only ones universally formed, all the others depending upon local abrasions for their materials, which, transported and deposited mostly by water, are local in their distribution. Animal life is now, and must have been from the beginning, dependent upon vegetable life as the only source of its food. The first traces of organic remains should for this reason represent plants. The primitive or archæan formations have deposits of graphite or plumbago, a matter essentially composed of carbon. It is not known as yet how this matter has been produced or whence

it is derived. It has been and may be ascribed to vegetable and animal life, represented at its beginning by beings of very simple soft texture, like the confervoid filaments which at our time live in thermal springs, filling basins of water of the temperature of the boiling point mixed with animalcules or infusoria. The remains of these plants and animals could not have been preserved, or at least could not be discovered, in the crystalline matter of the primitive rocks. The presence of graphite in the carboniferous strata of Rhode Island, and the close likeness of some beds of anthracite of this basin, which in some of its veins is scarcely distinguishable from graphite, point to vegetables for the origin of this substance. For even the hardest layers of anthracite or graphite of Rhode Island bear well preserved remains of plants of the carboniferous period, and evidently their carbon has been derived from vegetable life. The graphite of the primitive rocks, however, like the crystalline matter, granite, mica, hornblende, syenite, &c., may be due to some as yet unknown combinations of the primitive matter of our globe. The primordial or Cambrian period is subdivided into two epochs: the upper, called the Potsdam, and the lower, the Acadian epoch. In this last formation the first remains demonstrating vegetable life appear in some fucoids or marine plants of undefined forms. They become more numerous and more distinct in the Potsdam sandstone, in which large species of algæ have been obtained and described. Their size indicates already a high degree of organized life. In the Canadian period, especially in the calciferous limestone which constitutes its lowest division, these fucoidal remains increase in abundance, representing many more species, and the rocks where the remains are imbedded are often discolored by what appears to be an impregnation of mineral oil. The matter is however very sparingly distributed. But in the Trenton period, from its lowest division, the Trenton limestone, to the Cincinnati, its upper epoch, the marine vegetation is evidenced not only in an abundance of petrified plants, but in local deposits of mineral oil, especially found in connection with a predominance of fucoidal remains, which thus attest one of the wise purposes of their life in the great plan of nature. The Hudson shales give mineral oil sparingly; the Cincinnati limestone has yielded it abundantly; the black Utica shale of the same period has sometimes from 12 to 20 per cent. of mineral oil; but no trace of coal has been found in the rocks of the Trenton period. The three divisions of the Niagara period, the Niagara, the Clinton, and the Medina, have also, in their shales, limestones, and sandstones, a prodigious abundance, in some localities at least, of marine plants. In Pennsylvania the Clinton ferruginous red shale is covered over wide surfaces with these kinds of vegetable remains, together with a proportionate number of remains of

TABLE OF SEDIMENTARY STRATA, AND THE PLACE OF COAL AMONG THE ROCKS.

English Equivalents.	Pennsylvania.	Newenclature.	New York.	Missouri and Illinois.	Maximum and minimum thickness.	Kansas and Colorado.	Maximum and minimum thickness.	REMARKS.
Recent.	Drift, &c.....	Pennsylvania.	?	Drift, &c.....	150	?	250 to 1,500	Containing lignite coal beds.
	Tertiary.....		?	Tertiary, no coal..	200		1,500	Limestones and red sandstones.
	Cretaceous.....		?	Absent.....	0		250 to 1,000	{ Richmond, Va., coal. Not investigated in the west.
	Oolitic.....		Absent.....	Absent.....	0		?	{ Containing gypsum, marls, &c., in Kansas and Colorado.
	Triassic.....		Absent ?	Absent.....	0		800 to 500	Magnesian limestone.
	Permian.....		{ New red sandstone.....	Absent ?	0		1,000 to 1,500	
PALÆOZOIC.	Coal measures....	XIII.	Absent.....	Coal measures....	{ 500 to 3,000		1,000 to 3,000	{ Concealed in Colorado by the tertiary.
	Millstone grit....		Absent.....	Millstone grit....	{ 100 to 1,500		8,000 to 100	
	Carboniferous limestone.....		Absent.....	Carboniferous limestone.....	300		150 to 750	Occasionally seen in Colorado and Dakota.
	Sub-carboniferous		Gray and white sandstones....		750 to 1,000			
	Old red sandstone.		Catskill.....					
	Eifel.....	VIII.	Chemung, Genesee, &c.....	Bituminous slates, shales, and limestones	800 to 500	Not seen.....	?	Concealed or wanting in the far west.
Devonian.	".....		Corniferous, Onondaga, &c.....					
	Ludlow.....		{ Oriskany sandstone, &c.....	Oriskany.....	0 to 50			
	Wenlock.....		Saliferous, Niagara, &c.....	Limestone.....	300 to 700	Not seen.....	?	Concealed by tertiary in Colorado.
	Caradoc.....		Medina sandstone, &c.....	Medina sandstone.....	?			
	Bala rocks.....	III.	Slates and limestone.....	{ Galena and magnesian limestone and calciferous sandstones....	300 to 1,000	Galena and magnesian limestone.	?	Occasionally seen in Colorado and Dakota, but generally concealed by the tertiary, &c.
Cambrian.	Festiniog group...		Limestones.....			Potsdam sandstone.....	50 to 250	
	Lingula flags.....		Calcareous Potsdam sandstone..		100 to 250			
	Gneissic.....	I.	Huronian gneissic	(Ozark) gneissic...	500 to 1,000	(Rocky Mts.) gneissic.	5,000 to 10,000	Metalliferous group of the Rocky mountains.

marine animals, attesting the dependence of animal upon vegetable life, or at least their relation to it. Rich deposits of mineral oil are found also in the rocks of this period, especially in the Niagara limestone. At Chicago, for example, this rock is completely saturated with oil. The Salina and lower Helderberg periods are generally composed of deep marine formations, where of course remains of plants are very rare, as seaweeds do not live at a great depth. Even the Salina formations have few animal remains. But the last period of the Silurian formation, the Oriskany, manifests its vegetable life not only by remains of marine plants, but near its upper part by the first traces of land vegetation, recognized in fragments of a species referable to the lycopods or club-moss family, and similar in size at least to the ground pine of our woods, *lycopodium selago* and *L. lucidulum*. They are the earliest representatives as yet known of a family of plants to which belong the genera *lepidodendron*, *sigillaria*, &c., which come later, and, by the great number of their species and the enormous size of the trees generally representing them, are called to play at a subsequent period a remarkable part in the formation of coal. From the beginning of the Devonian, the corniferous, vegetable remains appear in the strata in a far greater abundance, especially those of marine plants, together with a proportionately increased supply of mineral oil. It is the epoch of the cauda-galli grit, so called from the distribution in the rocks of a large fucoid which covers with its debris wide surfaces of shales and fills strata of great thickness. This plant passes up through the whole Devonian to the base of the carboniferous. The bitumen has been during this period treasured in large crevices of the rocks, in cavities wherefrom it is now pumped out and utilized. The oil wells of Canada come from deposits in the cauda-galli formation; in New York the cavities of the corniferous limestone, even those which have been formed by the decomposition or destruction of fossil remains, are filled with mineral oil. Above the corniferous, the black shales, the Marcellus and Genesee shale of the Hamilton period, are everywhere impregnated with bitumen, from which they receive their black color. The combustible matter is abundant enough to percolate through the fissure with water; it is also obtained from the shale by distillation. Even these black shales have been used for fuel, giving a bright flame, though they do not consume. They have been constantly searched for coal; but no coal has been found in this formation, which from its fossils is evidently of marine origin. With the bones and teeth of large fishes, it has also the remains of seaweeds to which its bituminization is due. Some scattered trunks, of conifers especially, and mostly silicified, have been dug out of the black shales of the Hamilton period. They seem to have been floated and deposited along low shores by the waves

or the current of the sea. In a few localities in Canada ferns and other plants have been observed seemingly deposited in place. But nowhere has the land vegetation been luxuriant enough to produce coal, though the genera, if not the species, represented by these plants are closely allied to those of the carboniferous period. The upper Devonian, especially the Chemung, presents by its vegetable remains the same character as those of the former period; but the land vegetation becomes more and more predominant, yet not enough to produce coal. Moreover, most of the upper Devonian strata represent beach formations by their red shales. These formations have a distinct flora, far different in its typical characters from that which is recognized in the composition of coal. These extensive mud beds washed by the tides, alternately above and under water, were preparing a solid basis for the land, or a ground for the remarkable period which was to follow. —The carboniferous period, as the word implies, is essentially that of the coal formation. Its lowest part, the subcarboniferous, is its foundation, laid upon the mud beds of the Devonian. In the east of the North American basins, it is composed of thick strata of hard red shale and sandy rocks; in the west, of beds of hard compact limestone and sandstone, overlaid by the successive stages of the carboniferous in a thickness of 2,000 to 3,000 ft. From the base of the subcarboniferous measures, the land plants already in abundance appear, in ascending, in a constantly increasing proportion, while the marine plants disappear in the same degree. The composition of the first or of the lowest bed of coal indicates only the remains of land plants, which henceforth, in the whole thickness of the coal formations, constitute the vegetation; at least no remains of marine plants have been found in connection with the coal, or appear to have contributed to its composition. From the millstone grit to the Permian, the shales are mostly covered and filled with fragments of plants, which without exception belong to the species of the coal or land flora; and in some beds of sandstone also we find local deposits of trunks now silicified or petrified, all representing species of ferns, *lepidodendron*, *sigillaria*, *calamites*, &c., to which the coal plants are referable. The first coal beds appear in the upper part of the subcarboniferous, or somewhat lower, a short distance below the millstone grit, a formation composed of sand and pebbles agglomerated, and for this reason named conglomerate, which generally underlies the productive measures as well in Europe as in America. Under the millstone grit a few beds of coal have been formed locally, two, rarely three, not of great thickness nor of wide extent, sometimes merely in pockets, as they are called, the matter transformed into coal having filled deep hollows of an irregular bottom and of small area. In Arkansas, however, the whole coal-bearing measures are under the

millstone grit, and generally contain two beds of coal, even sometimes three of wide extent, and varying in thickness from 1 to 4 ft. In eastern Kentucky and Tennessee, also in Indiana, two lower coal beds 2 to 3 ft. thick are found under the conglomerate, in near proximity to its base; and in Illinois a lowest bed of coal has been observed under the Chester limestone, an upper division of the great limestone formation which there underlies the coal measures. Coal is found in Nova Scotia, in Scotland, and in Russia also below the millstone grit. But it is only from the millstone grit upward, and in a thickness of 300 to 1,000 ft. of measures, according to the localities, that coal beds are formed of great thickness and of wide extent. The second bed of coal above the conglomerate (B) is generally composed of two or three different beds, either united in one or separated by beds of shale or even of sandstone. This bed is found over nearly the whole extent of the coal measures from Missouri to eastern Pennsylvania, and even to Massachusetts and Rhode Island. Its thickness is rarely under 3 ft., more generally 6 to 7 ft.; at Straitsville in Ohio it is 12 ft.; it is 30 ft. or more in some localities of the anthracite basin of Pennsylvania. From the millstone grit upward, in a thickness of from 500 to nearly 1,000 ft., coal beds are formed of various thickness and extent, alternating with strata of shale, limestone, sandstone, &c., up to the great Pittsburgh coal, which is, near the end of the productive carboniferous formation, what the big vein is near its beginning. The Pittsburgh bed covers, in Pennsylvania, Virginia, and Ohio, an area estimated at 20,000 sq. m., preserving generally a thickness of 4 to 6 ft., and often greater. Between the millstone grit and the Pittsburgh coal, five to twelve veins are generally found in the measures. Of course the productiveness of the measures is locally very variable. It is at its utmost in the anthracite region of Pennsylvania. At Plymouth, near Wilkesbarre, for example, where the big vein is 30 ft. thick, a section of 300 ft. of measures has 50 ft. of coal in five veins. At Scranton a section of 350 ft. indicates 60 ft. of coal in eight or nine beds. Here the largest vein is 14 ft. In the same region a section of 800 ft. has nearly 70 ft. of coal distributed in 15 beds. In the bituminous coal region of Pennsylvania and Ohio, as well as in the coal basin of Indiana and Illinois, the thickness and number of the beds of coal are somewhat reduced, as is also the thickness of the measures; but there is a remarkable relation between the formation of the coal beds and that of the intermediate strata. In the north at least, or with the exception of the Virginia coal fields, the relation indicated above is, with little difference, as one foot of coal in 18 to 22 ft. of measures; or in 500 ft. of coal measures there is generally an average thickness of 25 ft. of coal, distributed of course in several beds of various thickness. From the Pittsburgh coal

above and for nearly 1,000 ft. of measures the productiveness of the carboniferous formation diminishes in such a way that, though several coal beds have been observed, they have scarcely been found anywhere of a workable thickness. The reverse of the fact remarked in the subcarboniferous, where as the land plants become more numerous the deposits of coal also increase, is seen in passing higher up above the Pittsburgh coal to the end of the carboniferous. The plants which by their components and their great size contributed most to the formation of the coal, the *lepidodendron*, *sigillaria*, &c., decrease in numbers and even disappear. Several species of the carboniferous period are seen still persisting later, even in the Permian epoch; but these species are merely ferns and calamites, which, though large and abundant enough, do not seem to have formed any dense agglomerations of woody material, like those which evidently covered the surface of the earth when the vegetation was in its full vigor.—The strata intermediate to the beds of coal are composed of sandstone, sometimes hard enough to be cut in blocks and used for building, sometimes soft and passing to shale; of limestone, iron ore, clay, and bituminous shale. Most of the coal beds rest upon a bottom of grayish or whitish soft clay, generally mixed with remains of the *stigmairia*, a floating plant, the most common in the coal measures, which seems to have entered largely into the composition of the clay and of some kinds of coal. The bottom clay varies in thickness from a few inches to more than 30 ft. When penetrated by ferruginous solutions, it becomes reddish, and is sometimes hardened to such a degree that it resembles limestone and breaks under the hammer like hard rock. It is the rotten limestone of the miners. Very rarely the coal beds are in immediate superposition to sandstone; none have been seen as yet upon limestone without an intermediate bed of clay. In most cases, as a coal bed becomes at its base mixed with clay which at the point of contact is black, hard, and bituminous, it passes at its upper surface into black bituminous shale or slate differently composed from that of the bottom, laminated like the coal, or in thin layers and mixed with remains of the plants which have entered into the composition of the coal. These shales, however, do not always occur, and therefore the roof of the coal is often sandstone, or more rarely limestone. With the remains of plants, the roof shales have also fossil shells, bones, or teeth of fishes. The limestone beds of the coal have rarely if ever remains of plants, but often a great quantity of animal remains, coral, crinoids, fishes, and especially shells. As will be seen hereafter, the distribution of all these kinds of strata is normal and explainable, as is also the formation of the shales, which are seen not only as the roof of the coal beds, but interlying them, and unfortunately sometimes in numerous al-

ternate layers with which the pure coal is so closely mixed that these coal strata are not workable. It is to the increasing thickness of these interlying clay partings, as they are named by the miners, that the subdivision of the coal beds is mainly due. Frequently coal beds are seen in one bulk at one place, and in another, divided into two by a clay parting, which by and by thickens to 10 or 20 ft. or more, and thus separates the coal into two distinct beds.—As remarked above, the Permian, at least in America, has no coal. The characters of this formation are somewhat similar in the nature of the rock to those of the subcarboniferous, mainly consisting of red shale, limestone, and sandstone. With some species of ferns of the coal measures, its flora is represented by large calamites, a genus whose species have the texture and outside form of the horsetail plants of our time, but of an immense size, and especially with new types of conifers. In North America the Permian formations are mostly composed of thick strata of magnesian limestone, overlying the upper coal measures of the west, near and along the Missouri river, especially in Kansas, and also in the Rocky mountains, where it generally underlies the cretaceous formation. The triassic period, in ascending, follows the Permian. It is represented in North America, especially in Nova Scotia, Connecticut, New Jersey, and Pennsylvania, by deposits of red hard shale with few fossil remains, and in North Carolina and Virginia by the same kind of rocks, containing however beds of combustible mineral or of coal. The coal of Richmond, that of Deep river and Dan river, is worked out of beds 4 to 6 ft. thick, and is reported to be of good quality. In connection with the coal strata, and in their roof shales, remains of fossil plants are found in profusion, indeed in the same position and in the same abundance as the remains of plants are seen in the true coal measures; but they represent far different species. With some ferns of a peculiar type, the fossil plants of the trias are mainly species of conifers, and in the greatest proportion species of *cycadeæ*, a family which is predominant also in the flora of the Jurassic period. Of this period, which in Europe is a formation of immense thickness, we have little in America. It has been recognized in the Rocky mountains in some beds of limestone. In one of its divisions, the oölitic, it has some fine deposits of coal in England. These beds, like all the coal beds, are overlaid by black shale imbedding vegetable remains, which mostly represent species of *cycadeæ* and of ferns.—Over the Jurassic we find the cretaceous. Like those of the upper Devonian, the subcarboniferous, and the Permian, its strata are mostly marine and submarine (beach formations), denoting an epoch of subsidence to prepare, after the destruction of ancient races of plants and animals, a new organic world by great changes in the atmospheric and surface circumstances of the earth. Forma-

tions of this kind have no coal. Their vegetable remains are mostly marine, and in the cretaceous they are locally present in connection with strata impregnated with bitumen. This is the case in California. The cretaceous formations of North America are extensive, and are distributed from the upper Missouri to the base of the Rocky mountains, where their thickness reaches 2,000 to 3,000 ft. The lower part, that which has been named the Dakota group from its predominance in that territory, is composed of red shale, and is evidently a beach formation immediately overlying the Permian. Though this group has no coal, but merely thin streaks of black bituminous shale, it is remarkable for its remains of fossil plants, which most of all represent dicotyledonous species. As high as the base of the cretaceous no plants of this vegetable division have been recognized. From the first appearance of land plants at the base of the Devonian, up to the cretaceous, all the species represented by their remains are referable to cryptogams and gymnosperms, these comprising the cycads and the conifers. But all at once in this Dakota group, which in America is the lowest cretaceous, we find an abundance of leaves of dicotyledonous species, sassafras, sycamore, oak, tulip tree, &c., without any remains of the former precedent and prominent types. From the Dakota group upward there is a succession of cretaceous sandstone and black shale, whose fossils are all animals, mostly large shells of species indicating a deep marine formation; and upon this a succession of thick beds of coarse hard sandstone, somewhat similar by its compounds to the millstone grit of the carboniferous, containing, especially in the intermediate layers of shale, a great abundance of fucoids and broken fragments of wood, stems, &c., appearing as brought up and mixed with the sand of the shores by the waves.—Further west, and along the eastern base of the Rocky mountains, this sandstone formation is the lowest stage of the tertiary period. It points by its compounds to the slow upheaval of a new land, and opens a new epoch where the conditions for the production of coal appear nearly as favorable as they were during the period of the true or old carboniferous formation. Along the base of the Rocky mountains, and in the high valleys of the interior of the chain, from the Rio Grande in New Mexico along the Pacific slope to Alaska, coal beds of the lower tertiary cover wide areas, and are sometimes of great thickness. In Colorado the veins now actively worked vary in thickness from 4 to 15 ft. At Evanston, Utah, the main coal, interlaid with bands of slate, is 26 ft. thick. The succession of the strata and their distribution is also remarkably similar to that of the carboniferous measures. At Marshall's, for example, in Colorado, an exposed section of 450 ft. of measures indicates 60 ft. of coal distributed in nine or ten veins, the lowest 14 ft. thick, separated by strata of sandstone, iron ore, clay,

shale, &c., as are the coal beds of the carboniferous measures. Here also most of the beds of coal, if not all, are underlaid by soft white or gray clay, sometimes pure and used for pottery, like the clay of the carboniferous, sometimes dark-colored by heaped fragments of radicles of water plants. The shale and sandstone strata generally contain a profusion of remains of land plants, whose characters, related to this period, are far different from those of the carboniferous. They mostly represent palms with dicotyledonous species, oak, poplar, walnut, hickory, magnolia, cinnamon, &c. The flora of these tertiary measures of North America has afforded already many hundred species of fossil plants.—The combustible matter or the tertiary coal, often called lignite, is in its aspect scarcely distinguishable from true coal. At some localities, especially in the upper part of the measures, it is softer and more easily broken; but at others the matter is hard, compact, distinctly laminated in thin alternate layers of crystalline and more opaque matter, gives much heat by combustion, the best kinds in some localities, as at San Pete in Utah, even producing good coke, and when the beds are in proximity to upraised dikes of basalt or lava the coal is transformed into anthracite. Nothing then distinguishes this tertiary lignite from true coal but a less proportion of carbon in its compounds, and this can be recognized by chemical analysis only. The constituents are the same; only in the lignitic coal the decomposition is not as far advanced, as will be seen by comparing the analyses of the different combustible materials. In the upper tertiary, beds of lignite coal are still found, but they are less predominant, diminishing in number and thickness and in the extent of the area which they cover. The materials also in ascending gradually appear in a less advanced stage of decomposition.—In Europe lignite beds of the upper tertiary represent mere deposits of wood, especially trunks of trees transformed into a black soft substance, which preserve still the vegetable forms and also the texture of the wood, as well as if the trees had been recently cut. Later still, or rather nearer to our present epoch, the composition of the beds of lignite becomes undistinguishable from peat. To complete the similarity, old peat beds, as is especially the case in Holland, are found under thick strata of clay or sand, in two or more successive stages, or under thick gravel deposits of the drift of the quaternary. The material is mere soft peat, which by drying becomes hard as stone, and a combustible nearly as good as lignitic coal. Along the Ohio river and at various places in Ohio, Indiana, Illinois, &c., we find thick peat deposits in the clay of the drift. The bottom of the bed is clay; the combustible matter is true peat; the beds overlying it are generally hardened clay wherein leaves, nuts, acorns, &c., are found, most of these vegetable remains being already

carbonized or hard and black as coal, as in the roof shale of the coal measures. In some localities trunks and branches of trees are imbedded in these clay formations; the woody substance of these vegetable remains is already softened and decomposed, and its place taken by the infiltration of clayey matter. They only need the hardening done by time to become fossilized trees, and henceforth, after the drift period, we have as representative of the carboniferous formations peat bogs of different ages: some very thick, overlaid by strata of humus or of sand or gravel; some more recent, covering the ruins of monuments of the human race, bridges, roadways, aqueducts, &c., or holding in their matter bones of extinct or nearly extinct races of animals, like those of the aurochs, with utensils, weapons, and ornaments, attesting the existence of races of men now unknown. But some deposits of peat are so recent that their beginning is positively remembered by old men, who have seen them grow to some thickness where as children they had seen only stagnant pools, or a forest, or a muddy swamp. All these peat deposits, like the beds of coal and of lignite, are found in connection with vegetable remains which are either dead and cover them entombed in the clay of their surface, or are still living and deposit and heap their woody matter upon them, thus constantly increasing their thickness. We must therefore acknowledge that from the beginning of what we call the geological formations, or from the base of the Silurian to our time, remains of plants are found in intimate connection with all the deposits classed under the denomination of combustible minerals: marine plants or seaweeds, with the strata containing oil or bitumen; land plants, with the deposits of coal in all its degrees of hardness and perfection, from the soft peat, which is merely unripe coal, to the hardest anthracite.—The origin of the coal, or at least its essential composition, is apparent from what has been said of its geological distribution. The first hypothesis thrown out on the subject was that the coal was a mere mineral or bituminous compound deposited and distributed in the series of the rocks like strata of other nature. As it is mostly in concordant stratification with them, it was therefore considered to have the same origin. But the formation of the strata of the earth is easily accounted for: the sandstone by erosion of primitive rocks, the removal, transportation, and deposition of the matter; the limestone by the submarine action of animal life, &c. As free bitumen does not exist in nature, deposits of bitumen in the rocks are an anomaly as long as the origin of bitumen cannot be positively indicated. Moreover, there is a great difference between bitumen, or rocks impregnated with bitumen, and coal beds. Hardened or oxidated bitumen has been found in a few instances filling crevices of rocks, as in Canada and in West Virginia; the matter is homogeneous, either semi-pellu-

cid, like dark-colored glass (the albertite), or a dull black compound comparable by its appearance to cannel coal (the grahamite), but filling holes, without concordance of stratification with the rocks wherein it is deposited, and proved by chemical analysis to be mineral oil oxidated and thus solidified by long exposure to atmospheric influence. Cases of this kind explain nothing concerning the origin and nature of coal, and therefore the first hypothesis was soon set aside.—That coal is composed of woody matter or of vegetable remains is easily recognized by ocular examination. In carefully inspecting a piece of coal the observer will in most cases see it formed of thin parallel layers of semi-transparent or crystalline matter, alternating with more opaque, earthy ones of the same thickness. These layers, about the tenth of an inch thick, are distinct enough to be counted like the rings indicating annual growth upon the horizontal section of a tree; and this even upon anthracite as well as bituminous coal. In splitting a piece of coal in the plane of stratification or of the layers, the exposed surface generally bears a pulverulent matter resembling charcoal; and this under the microscope is seen to be composed merely of vegetable fibres. Often the original form of the plants from which these woody fibres are derived (bark of *lepidodendron*, *sigillaria*, calamites, leaves and stems of ferns, &c.) is visible to the naked eye. In some cases a piece of coal a few inches square is seen with its faces covered with branches and leaves of ferns perfectly distinct in their outline and nervation; and in that way as many as five species have been identified upon the same surface, from their carbonized skeletons. In other cases, as in cannel coal, the fibrous texture of the matter cannot be recognized at first; but if thin layers of such coal are exposed to the action of a strong acid, the black bituminous substance is dissolved and the fibres are exposed whitened and distinct. Interesting researches have thus positively established the fact that coal is composed of vegetable debris. This conclusion agrees with the facts recorded above in regard to the distribution of the coal strata, which in the geological formations of all the epochs have been seen always in connection with vegetable remains.—But the essential fact, the origin of coal from vegetables, being admitted, the mode of nature's proceeding is not yet explained; and the question is still, whence have been derived the woody materials for the composition of the coal, and how have they been brought together and heaped in such immense masses of combustible as are represented by coal beds 10 to 20 ft. thick or more, extending over areas of many thousand square miles? Only two hypotheses are worth considering: that of the transportation and heaping of woody materials by water, and that of the growth of the materials upon the same surface now occupied by the coal beds. The first theory presupposes

that forests growing upon slopes along lakes or seashores had been torn down by whirlwinds, and that the trees had been then carried by floods to the bottom of the lakes or to the sea, and there entombed and transformed into coal. This hypothesis could scarcely account for the formation of coal beds of very small extent. In the transportation of trees or vegetable remains by water, a large proportion of sand, mud, &c., would of course have been swept down with the forests, and mixed in the deposits with the wood, rendering the matter very impure. Moreover, the coal deposits are generally in flat basins of wide extent, and an equal distribution of the trees in horizontal layers is an impossibility by transportation of this kind. Another difficulty in the amount of woody matter which enters into the composition of a coal bed is not generally known, and is far above every hypothetical calculation. Considering areas of the same extent, a coal bed 6 ft. thick is equivalent to all the wood which could be produced by a forest in 2,400 years, and this supposing that, as is done in the government forests in France, all the wood should be cut in its prime and the cultivation of the forests cared for in order to force the productiveness to its highest degree. Some beds of the carboniferous measures of North America, the Pittsburgh coal, and the big vein, with an average thickness of 6 ft. at least, cover an area of more than 20,000 sq. m. Who would dare to suppose the production of such a mass of vegetation along a river, its carriage to the sea for 2,400 years, and its deposition upon a continuous surface in horizontal strata of an even thickness? Moreover, the lamination of the coal, its horizontal and continuous extent over wide areas, the formation of the shale above the coal (shale generally mixed with an abundance of vegetable remains, some of them very large), the presence of standing trees or standing petrified forests either in the clay beds under the coal, or even imbedded in the coal beds, or rooting in the clay beds above—all these facts, seen in connection with the coal formation and a number of others, are inexplicable by the theory of transportation. We have therefore to come to the second hypothesis, and to see whether coal beds proceed, like the peat beds of our time, from the growth of vegetables the debris of which have been yearly and successively heaped in place and then transformed into coal. This is called the peat-bog theory.—The formation of peat is generally little known or understood. Few works have been published on the subject, and as the bogs are generally of difficult and even of dangerous access, they are rarely examined carefully enough to obtain full evidence as to the details of their formation. And furthermore, this study demands a knowledge of botany and chemistry rarely attainable by the student before the years of his strength for field explorations are passed. Peat is formed in shallow water or in bogs, by the growth of

plants which may be called bog plants, and which belong to a peculiar group of vegetables composed essentially of woody tissue and living either in water or above water, according to local circumstances. The species of plants forming peat in our time do not thrive out of the bogs, neither do land plants invade the bogs and contribute by their remains to the composition of peat. The bog plants demand first, for their establishment and their growth, a shallow basin of water with an invariable level. A basin of this kind is generally prepared in advance by the deposition of a clay bottom, produced from the decomposition of water plants or plants living entirely under water, whose tissue from this cause is not woody or fibrous; for the woody tissue of the plants is derived from the atmosphere, chiefly by the respiration of the leaves, and constitutes a part of the compound generally proportionate to the degree of humidity and the amount of carbonic acid of the atmosphere wherein they live. The conferves and the charas which fix lime or silex in their tissue and feed fresh-water mollusks, sometimes in immense number, are especially the plants which by decomposition form a kind of clay. In some circumstances this vegetation has, by its remains and those of the shells, established a thickness of muddy clay of 2 to 6 in. in a year. When this bed of clay has rendered the basin water-tight, it becomes a prepared ground for the growth of other plants, which, rooting in the soft bottom, ascend upon long stems or long stalks to the surface, where they expand their leaves and open their flowers. These are at the same time aerial and water plants; their tissue is woody like that of some species of mosses, which appear at the same time, and floating at the surface absorb carbonic acid and water by their innumerable small leaves, and thus have in their compounds as large a proportion of woody matter as the hardest wood. Every year the remains of this vegetation are pressed down to the bottom, and successively heaped till they reach the surface of the water. Of course this first deposit becomes in time solid enough to receive other kinds of plants which root upon its surface: species of mosses, sedges, and trailing bushes; then larger shrubs, then trees, which, with the smaller species that continue to grow under them, increase each year by their debris the amount of material which, constantly heaped, constitutes what is improperly called the growth of the peat. This is the simplest and most ordinary proceeding in the formation of peat. The process of transformation of vegetable matter into peat is due to the presence of water, as is apparent from a consideration of the different modes of decomposition of vegetable matter as explained by chemistry. When wood is immersed in water and thus guarded against the action of the atmosphere or of the carbonic acid which causes its decay, it is preserved sound for a very long time. Roman construc-

tions, even foundations of the lacustrine buildings of wood, have been dug out still solid and unimpaired by decay from lakes and swamps of Europe; but the wood has become entirely black. When the materials which enter into the composition of peat are growing in a deep basin of water, and their debris are heaped under water, the preservation of the matter against rapid decomposition is then the direct result of immersion. The growth of the peat in cases of this kind may be stopped at the water level, where by a more complete decomposition of the plants a coat of humus is formed, which being invaded by land plants is transformed into a prairie or a forest.—But more generally peat grows above the water level, and then the production of the matter and its protection against the influence of the atmosphere are essentially due to the agency of a peculiar kind of moss, the *sphagnum*. This moss, which in deep water vegetates in loose extensive matings, extending over the surface like a vegetable carpet, becomes out of water transformed into compact tufts, and its long slender stems, then growing closely pressed against one another, are knit together. The sphagnum is in that state a veritable sponge, endowed with an extraordinary power of absorption. Not only does it draw the water from below by its long capillary stems, which, growing without interruption, are imbedded very deeply in the matter of the bog, but it especially imbibes it from atmospheric humidity by its innumerable small leaves, and thus is constantly saturated with water. Its growth is rapid; where more space is afforded, it extends its plants all around, covering the whole surface of the bogs and every kind of woody debris spread upon it. Its tufts go up the roots of the trees, and surround the standing trunks one to two feet high; they pass over the prostrate trees and their branches, and bury them under a thick carpet which preserves them against atmospheric influence. In foggy countries, as in Ireland and Germany, the sphagnum ascends steep slopes and builds its peat deposits from the plains to the tops of high mountains. This moss is indeed by itself a remarkable phenomenon in the economy of nature; being a kind of balancing power, absorbing the useless surplus of water from the ground, from the swamps, and from the atmosphere especially, using it in part for its growth, carefully husbanding it for the preservation and transformation of all the woody tissue, its own included, into peat, and in dry seasons distributing the remainder to feed the numerous springs which have their source in the bogs. Thus, the peat bogs, like the glaciers of some countries, feed mighty rivers. In the Mississippi, for example, the blackness of the water, which is preserved as far down as St. Louis, proves its origin. It is nothing but bog water; hence its extreme salubrity and its remarkable incorruptibility.—Along the low shores of some lakes and of the sea, the bog vegetation sometimes begins from

a sandy bottom without an intermediate clay bed. This happens especially when shallow basins of water are closed by sand deposits, and thus totally separated and guarded against the invasion of outside water and the muddy materials which might be brought upon it. These basins have a permanent level, and thus the work may proceed without interruption. The peat formed in that way rests immediately upon a bottom of sand, as coal beds are found sometimes also upon sandstone. It happens, however, that in some deeper part of the same basins the subaquatic vegetation is established, and its decomposition forms beds of clay or a clay bottom whereupon the old coal plants take root at a later period. The same bed may therefore at different places rest upon clay or upon sand. This fact also is remarked in coal beds of some extent whose bottom is at intervals either clay or sandstone. It also frequently happens, especially in small lakes and bayous, that the peat vegetation begins at the surface with floating masses, which gradually invade the whole space, covering it with a vegetable carpet. By successive annual growth and deposits this groundwork becomes thick and more solid; shrubs and even trees take root and grow upon it, till the mass becomes too heavy, is split or torn asunder, and sinks to the bottom. Other series of vegetation may begin again in the same way and be successively heaped upon one another, peat beds and forests, till the basins are filled. From some of these filled lakes now discovered under thick strata of humus, peat and wood, and even large trees which could be used for building, have been dug out to a thickness or a depth of 75 ft. or more. In New Jersey a considerable business has been done in fishing out of peat bogs the buried cedar timber. At other localities, as in the old bayous at the mouth of the Mississippi, floating islands, strong enough to support the construction of railways, have been formed in the same manner. Their nature is recognized by the vacillation and unsteadiness of the ground, which undulates under the pressure of a heavy weight like that of a railway train. At other places, as in the Dismal swamp, the formation is mixed. A bed of peat 15 ft. thick is formed over the swamps around Drummond lake, by the debris of large trees and of an impenetrable grove of canes, whose roots penetrate deeply into thick layers of sphagnum. It is there extremely difficult to reach the borders of the lake. They are mere floating moors, sinking under the weight and formerly extending over and covering the whole surface of the lake. This is proved by a layer of trees strewn at the bottom of the lake, and the process of nature may be seen still in activity along the borders, where large trees (bald cypress), sunk into the water, perhaps 8 ft. deep, are there slowly decaying in a standing position. Their trunks are already generally hollow, only the bark and a thin crust of wood being left; the water enters them of course, and fills them with

the debris floating upon the surface, especially cones and leaves. In time these decayed trunks fall to the bottom and are there imbedded either for slow decomposition to peat, or if covered with mud petrified by the softening of their tissue and the impregnation of mineral matters. In that way the hollow trunks discovered in the coal beds of England and Canada have been petrified; their bark only is preserved, and they are filled with cones, leaves, insects, shells, &c. These fossil trees were looked upon for a long time as an inexplicable wonder.—Various circumstances, as local depressions which bear water upon the surface of the emerged peat bogs and destroy their vegetation, stop the growth of the peat and change the surface into mud swamps. This is especially caused by alternation of level, or by the ground being covered with water at one time of the year and dry at another. Then the decomposition of the plants is rapid and entire, and its result is a kind of mud increased by the introduction of foreign materials brought by water. Leaves and vegetable debris are often imbedded in this matter and thus preserved by petrification. This represents the formation of the laminated clay shale which generally covers the coal beds as a roof, and contains in some localities vegetable remains in a beautiful state of preservation. Of course, these changes of level were formerly, especially at the carboniferous period, more frequent than now; for then the land was mostly of insecure formation, half floating, and along the sea immense tracts of land were engulfed, and so deeply sunk that their surface was covered with sand by the currents, or even at a greater depth invaded by the animals building and forming limestone deposits, shells, madrepores, corals, &c. In this way the formation of the sandstone and limestone which in some places overlie the coal beds without intermediate shale is easily understood. Cases of a similar nature are recorded from the peat bogs of our time. It has been said already that in Holland old peat bogs have been discovered by borings, at a depth of from 60 to 100 ft. below the surface, placed upon one another and separated by clay deposits of 30 ft. or more. The great peat bogs between the lakes along the foot of the Jura mountains in Switzerland sink in places under the sands of the lakes and are covered by gravel. At other localities the peat deposits of a thickness of 10 ft. are cut in the middle by a layer of coarse sand varying from 6 to 12 in. in thickness. We see therefore in the present formation of the peat bogs a counterpart of that of the coal, represented in all its details, though in a reduced proportion. Not a single case has been recorded in regard to the formation of coal which cannot find its counterpart and its explanation in some of the phenomena attending the present formation of peat. In the countries where peat banks are exposed and worked to their base by drainage, and where the nature

and distribution of their materials can be studied upon the exposed face of the beds, these compounds are seen constantly and extremely variable: heaped remains of woods, of mosses, sometimes whole forests prostrated and imbedded. But in these beds the alternation of the annual layers is always easily recognized. Near the top their thickness is generally more than an inch; near the base they become by maceration and compression reduced to one sixth of an inch or less. In the oldest peat bogs, the lower layers are formed of a soft pellucid matter resembling a black glue, alternating with a more opaque and fibrous material, thus exactly corresponding in their appearance to the pellucid and opaque laminae of the coal. Hardness or induration of this old peat seems to the eye the only process needed to transform it into coal. The submerged peat, that of the lakes or of the seashores, frequently and extensively formed in Holland, North Germany, and elsewhere, is not laminated; the matter is generally compact, homogeneous in aspect, and nearly reduced to paste, at least in its more advanced stage of decomposition. The difference is caused, as remarked already, by the semi-aquatic nature of the plants which enter into its composition, and which, being less fibrous than those growing upon emerged bogs, are more easily and equally transformed under water. This process explains the difference between the laminated bituminous coal and the compact homogeneous cannel. The immense trunks mixed in the beds of laminated coal evidently prove that some of the beds were formed above water. On the contrary, cannel coal, whose compounds, so far as they can be recognized as vegetable remains, are essentially the floating trunks and branches of *stigmara*, indicates as evidently that in this case the coal was formed of plants floating or submerged, thus presenting the two essential differences which are recognized in the peat beds of our time. Local variations in the phenomena attending the formation of immersed peat are quite as frequent and remarkable as in the formation of the emerged peat bogs. It would require a volume to describe them in detail. Near Kiögge in Denmark, along the seashore, extensive peat deposits now covered by a layer of humus forming prairies are composed merely of birch trees, whose bark is separated from the decomposed woody matter; this is a semi-fluid brown paste at the bottom, 4 to 6 ft. thick, and the bark at the surface forms a layer of hollow cylinders or compressed sheets without any woody matter between them. The exploitation of these deposits is made to get the woody paste, which is taken in buckets from under the layer of bark, spread upon beds of straw, and when somewhat hardened by the percolation of water is kneaded, flattened, and pressed with shovels, and then cut and dried, thus forming a very valuable fuel. The bark is left out of

the trenches as of little value. We have in this case the illustration of a peculiar formation of some beds of coal whose top is overlaid by a stratum mostly composed of pieces of bark of *lepidodendron*, *sigillaria*, *calamites*, &c., pressed upon one another without even laminae of coal between the layers. At Trevorton in Pennsylvania, a bed of semi-anthracite thrown up to the perpendicular is roofed by such a layer of petrified bark, and exposed like a wall of mosaic work, diversified by the impressions which mark the surface of the bark of most of the species of trees of the carboniferous period.—It has been objected to this theory of the production of coal, that the peat beds, however thick they may be, could not account for the immense mass of combustible minerals or of woody matter contained in a coal bed even of moderate thickness. This is a great mistake, for indeed nothing but the growth of the materials upon the place where they have been buried and transformed into coal can satisfactorily account for the immense proportion of woody matter in the deposits. The comparative caloric power of wood, peat, and coal has been found to be on an average represented by the proportion of 30 for wood, 37 to 40 for peat, according to its age, and 60 for bituminous coal. We have seen above what is the average production of wood under the best regulated cultivation of Europe. The growth of peat, as recognized from repeated observations, also made in Europe, averages one inch a year at the surface. By compression and decomposition the matter is reduced toward the base of the banks to one sixth or even one eighth of the original thickness. Comparing this production with that of the wood of a forest upon an equal area and in the same period of time, we see from the same records quoted above that the peat yields in cubic feet, after desiccation, twice as much combustible matter as the forest. Peat bogs are now, especially in wet countries, as in Ireland, Sweden, and Russia, not only of wide extent but of great thickness. In Switzerland and Germany the average thickness of peat beds is 8 to 12 ft.; but in the same countries the peat attains in some localities a thickness of 30 ft. in continuous and extensive beds. In Ireland, Denmark, and other northern countries, there are beds of combustibles formed of peat alternating with prostrated forests, from 60 to 80 ft. thick or more. Now, a bed of peat 30 ft. thick, comparing its matter with coal according to the proportion of 40 to 60 for caloric produced, and deducting one half for drying the matter and rendering it fit for fuel, would represent an amount of woody matter equal to that of a bed of coal 10 ft. thick. It is therefore conceivable that at the carboniferous period, when the atmosphere was saturated with vapors and carbonic acid gas, the essential elements which feed the plants and supply woody tissue, the luxuriance of the vegetation must have been far above that of our time. The heaping of

the vegetable remains must then have attained in favorable localities a thickness at least double that of the present peat deposits. The supposition that the plants at the carboniferous epoch contained more bitumen than those of our time has no foundation whatever, as bitumen is obtained from peat in as large proportion as from coal. Mineral oil, which also results, in its essential part at least, from the decomposition of vegetable matter, is in this particular only comparable to coal; but it is produced from marine plants which have no fibrous tissue, but merely cellular matter.—After reading the foregoing descriptions of the growth of peat, the admirable simplicity of the process used by nature to reach its end in providing deposits of combustible minerals in the several geological periods is evident enough. This identity, however, can be still more positively proved by comparing the chemical operations attending these formations, and the absolute similarity of the elements which compose the different matters known under the names of peat, lignite, coal, and anthracite. The composition of these combustible materials, as they are generally called, compared with that of wood and of woody plants which by their characters and texture are related to the most common species of the coal measures, and which enter into the composition of peat in our time, is presented in the following table compiled from Dana's "Manual."

SUBSTANCES.	Carbon.	Hydrogen.	Oxygen.
Wood.....	49·66	6·21	43·03
<i>Lycopodium dendroideum</i>	48·70	6·61	43·25
<i>Lycopodium complanatum</i>	48·43	6·61	43·02
<i>Equisetum hyemale</i>	47·50	6·68	44·49
<i>Sphagnum</i>	49·88	6·54	42·42
Peat.....	59·5	5·5	33·0
Brown coal or lignite.....	68·7	5·5	25·0
Bituminous coal.....	81·2	5·5	12·5
Anthracite.....	95·0	2·5	2·5

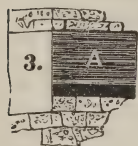
This table shows in *lycopodium* species and *equisetum* about the same composition as in wood. These correspond in structure, and have at the same time a generic relation to the species forming the essential compounds of coal as recognized by microscopical examination, viz.: *lepidodendron*, *sigillaria*, and *calamites*. The *sphagnum*, which enters more than any other plant into the composition of peat, has more carbon than lycopods, even slightly more than wood. In the decomposition of the woody matter two different processes are recognized by chemistry. Decayed wood taken from the interior of trunks of dead trees exposed to atmospheric action gives by analysis, on the average, carbon 47·62, hydrogen 6·18, oxygen 44·87; which compared with wood, C. 49·66, H. 6·21, O. 43·03, indicates that through this decomposition a proportion of carbon has been taken from the wood, while the hydrogen is slightly increased. The elements of water therefore, and an amount of oxygen, have become united with the wood, while carbonic

acid has been separated from it. This comparison of analyses exemplifies the well known fact that the decomposition of plants under atmospheric influences returns to the atmosphere the carbonic acid absorbed by the vegetation, which by nutrition of the living plants is transformed into wood. But when the woody matter is protected against the action of the oxygen of the air, as it is in vegetable remains under water or covered by mosses impregnated with water, the chemical changes as proved by analyses assume another form. This is the case in the formation of peat, which when ripe has C. 59·5, H. 5·5, O. 33, or compared with wood an increased amount of carbon in proportion with a diminution of oxygen, separated into carbonic acid with a little of the hydrogen of the wood. The amount of carbon in peat, as in all the mineral combustibles, is extremely variable; in young sphagnum peat it is no more than 51 to 52 per cent., while in old peat it is as high as 61 to 62 per cent. The proportion of bitumen increases in peat in the same degree. Taken from old beds, this matter has yielded by distillation 30 per cent. of bitumen. To obtain it, the distillation of peat has been practised for many years on the bogs of the Jura in Switzerland; and peat from the bogs of Ireland is also distilled in large establishments for manufacturing candles. This sufficiently answers the objection made against the theory of the formation of coal from heaped vegetables by annual growth like beds of peat, and the mistaken assertion that peat has no bitumen and therefore cannot form coal. The composition of peat as given above does not differ much from that of the more recent lignite of Germany, showing therefore the same process of chemical action. These lignite beds, mentioned before, are heaps of trunks overlaid by thick strata of sand and clay. The wood is black and quite soft, but its texture is still as well preserved and as distinct as in living trees. The matter in its purity has C. 57·28, H. 6·03, O. 36·10, or a less amount of carbon than old peat, with more oxygen; thus proving that the process of decomposition is exactly the same, but that it is in a less advanced stage. In lignite of an older formation the analysis indicates C. 68·7, H. 5·5, O. 25; therefore an increase of carbon, still resulting from the same combination, the diminution of the oxygen and of a little of the hydrogen of wood. As in peat, the amount of carbon in lignite is very variable, which results especially from the nature of the original compounds. The lignite of the old tertiary of the Rocky mountains, which in many beds has the same appearance, lamination, and nearly the density of the true coal, has only 51 per cent. of carbon in an average taken from the comparison of 21 analyses of the matter from many localities. This reduced amount of carbon is apparently due to the great proportion of palm wood and palm remains which entered originally into its composition. The average composition of the best quali-

ties of bituminous coal is C. 81·2, H. 5·5, O. 12·05; showing still the same proportion in the diminution of the oxygen and the increase of carbon. The chemical action is therefore constantly the same, and is recognized in the whole process; that is, the slow combustion of the woody matter by the action of the oxygen which it contains, or contained originally. Chemistry has not perfectly explained the process, or obtained similar results and products by its experiments. Prof. Dana says that the changes attending the ultimate decomposition of woody matter into coal depend: 1, on the affinity of the carbon for oxygen, making carbonic acid; 2, on that of hydrogen for oxygen, producing water; 3, on that of carbon for hydrogen, making carbo-hydrogen gas or oil; and 4, on the tendency of the carbon and the hydrogen under certain proportions to form with a portion of oxygen the staple compounds included in the term coal. In anthracite the amount of carbon is still increased, while that of hydrogen and oxygen has become proportionally less, and the volatile matter is reduced to a minimum. Hence pure anthracite is debituminized and burns without any flame. The anthracite of Pennsylvania becomes harder and more free from gas in proportion to the distance of the basins eastward from the Alleghany mountains, where its beds are folded in more numerous and sharper flexures. It has been supposed that its debituminization had taken place from some cause connected with the uplifting of the mountains. The first supposition was that the coal had been reduced to anthracite by heat. This opinion has been contradicted by another hypothesis which ascribes the transformation to great compression of the mineral coal by the upheaval of the mountains between whose sides the basins were slowly pressed, and thus slowly forced into numerous folds, and perhaps to a considerable amount of caloric produced by mechanical agency, movement, compression, &c. Many facts seem to contradict this last hypothesis, and support the opinion that the original heat of the earth has contributed to the metamorphism of the coal, as it has to that of the rocks. The problem is however complex, and cannot be discussed in a few words. The facts have to be recorded, and the conclusions may become evident in time. In Pennsylvania the debituminization decreases in proportion to the distance eastward from the mountains. At Trevorton, in Zerbe's gap, the coal is semi-anthracite; it has 84 to 86 per cent. of carbon, 7·50 of inflammable gas, and 2·50 of water. Though this basin is far distant from the mountains, the undulations of its beds are nearly as sharp as those near Pottsville and Tamaqua, being inclined at an angle of 50° to 60°. As the thickness of the strata is great, the pressure seems to have been equal to that nearer the mountains. In the Rhode Island basin the anthracite is still harder and more debituminized. Here the undulations are repeated, very

numerous, and short, but not sharp, resembling the waves of the sea, and the strata are not thick; but the anthracite is in close proximity to the primitive rocks, and the shales over and under the coal show by their color and density the evident traces of metamorphism. There is here a peculiar phenomenon marking the influence of heat; it is the liquefaction of the shale and the effects of it on the vegetable remains, particularly the ferns. Their branches are generally elongated in one direction and contracted in the other side, as though drawn to one direction by the flexure of the shales in a state of semi-fusion. The plants too bear upon their surface a kind of intumescence, seemingly produced by heat. At Trevorton the shales over the coal are more or less marked by small round holes varied in size, filled with a pulverulent bituminous matter which looks as if formed by a kind of ebullition, or rather by gas forcing its way from the anthracite and stopped and enclosed within the shale. In Arkansas the Spadra coal is semi-anthracite. The strata wherein it is interlaid are nearly horizontal, their dip scarcely marked by an angle of 2°. It is also at a distance of 30 m. from the mountains. It has about the same composition as the Trevorton coal, 88·75 per cent. of carbon, with 7·7 of volatile matter. The rocks all around in the country bear traces of metamorphism, and the change by heat becomes more and more evident in advancing toward the Hot Springs, a volcanic region, away from the mountains. The same phenomenon is still more evident, and its cause more appreciable, in the tertiary lignite basins of the Rocky mountains. At Golden, Colorado, the thick lignite beds, 12 to 16 ft., are thrown up to the perpendicular by compression, in close proximity to the base of the uplifted granitic mountains, and between them and thick deposits of lava. This coal is soft, bears no trace of metamorphism, and even crumbles from the contact of the atmosphere. In New Mexico the strata are horizontal, but split by thin dikes of basalt, along which the coal shale is changed by heat and nearly as hard as silex. The nature of the coal in contact with these dikes has been recorded from a locality further south, near the valley of the Gallisteo, where the Placiere coal at one exposure of the bank is true lignite, while at another exposure, and in contact with an enormous dike of basalt, it has been changed into true anthracite, having 89 per cent. of carbon and only 3·18 of volatile matter, while at a distance from the dike the amount of carbon is only 58 per cent. The dip of the strata even in coming closely in contact with the dikes varies between 10° and 14° only. These facts are evident proofs of the debituminization of the coal and its change to anthracite by the action of heat. In this we have at the same time an insight into the chemical changes causing the modification of vegetable matter and its transformation into coal. For the action of heat does not deprive the coal of any part

of its constituents; it merely quickens the slow burning or metamorphosis of the matter, the ultimate result of which is the entire reduction of the oxygen- and hydrogen-producing volatile gas into compact or condensed mineral combustible, a mere compound of the original elements of wood modified under peculiar influences.—The great Alleghany coal field extends from the middle of Alabama to northern Pennsylvania, and occupies portions of Alabama, Georgia, Tennessee, Kentucky, West Virginia, Virginia, Ohio, and Pennsylvania. It contains from 50,000 to 55,000 sq. m. of coal area, and all the coal beds and groups of beds described under the title ANTHRACITE, the nomenclature of which will be adopted herein. In some portions of the anthracite fields the millstone grit or conglomerate is interstratified from the bottom to the top of the coal measures, though much more massive near the bottom than in any other portion. It is also much thicker in the eastern part of these fields than in the western portion, and likewise more massive than in the bituminous fields, or westward generally, as the foregoing table indicates. A group of coal beds, O, not shown in the anthracite column, though existing there as “nests” of imperfect coal below A, are found



A, or Alpha

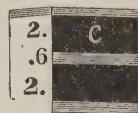
at irregular intervals throughout the Alleghany coal field; but these beds are thin, impure, often absent, and rarely of workable size or merchantable quality. They exist both below and in the millstone grit when found, and are more persistent and regular in the western than in the eastern coal fields. The first group of regular beds is A; these also exist in the conglomerate in the Pennsylvania anthracite fields, and in some of the outlying basins of the Alleghany field; but generally they consist of two small, unworkable streaks of impure coal, or a single bed of earthy coal 1 to 4 ft. in thickness, resting on or near the millstone grit.



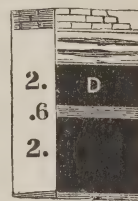
B, or Buck Mountain.

It produces the block or furnace coal of Pennsylvania. The next group, B, consists of two regular and excellent beds, which are generally united as a single bed, though always divided by a streak of slate or fire clay, which often expands to 20 ft. or more. This bed, or group of beds, is the most regular of all the American coal beds; and, being the first large, workable, and productive bed, its horizon is the most extensive, and nearly equal to the area of the entire field, while it can readily be identified in the central if not the western coal field. These beds, when united, are from 4 to 7 ft. thick, and singly from 2 to 4 ft. each. Immediately above this group, sometimes resting on the coal, but

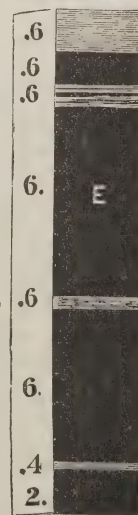
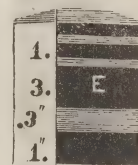
generally separated by slates and shales, is the micaceous sandstone, or “buckwheat rock” of the Pennsylvania mines, which is a coarse, massive sandstone, filled with mica scales. This rock is very persistent, and can be identified in all the great American coal fields of the carboniferous age. This great bed of sandstone, which is often 20 to 60 ft. in thickness, is followed by shales and the fossiliferous or ferriferous limestone, and the buhrstone iron ore, which are generally present in the Alleghany coal measures. The ore ranges from 10 to 20 in., and the limestone from 10 to 20 ft. in thickness. This is succeeded by shales and the group of coal beds C. In the anthracite regions, and generally in the bituminous fields, this group consists of two thin, slaty, and unworkable beds; but one of them frequently expands to 3 and even 5 ft. of excellent splint or canal coal. It is the celebrated Peytona canal bed of Coal river, West Virginia, and the Grayson canal of Kentucky. This group is succeeded by shales and sandstones of variable thickness, from 50 to 150 ft., on which rests the bed D, which is always single, and generally pure and workable, from 30 in. to 4 ft. in thickness. Above this bed, separated by sandstones and shales, is the Curlew or Freeport limestone, 8 ft. thick; and on or near this rests the group E, which embraces two or three beds of coal, each generally from 2 to 4 ft. thick, which often unite as a single bed of 6 to 12 ft., divided by slates. This group forms the celebrated mammoth bed in the Pennsylvania anthracite fields, and the Freeport beds in the western part of Pennsylvania. Above this group (which is very confusing to the miner and the geologist, on account of its irregularity and uncertainty in uniting and dividing) from 20 to 50 ft. of soft black shales or slate are generally found, and on these rests the Mahoning or mammoth sandstone, which is the largest regular sand rock in the Alleghany coal measures, ranging from 50 to 75 ft. in thickness, divided by one and sometimes two thin coal seams, and several feet of slates or shales. Streaks of quartz crystals are often found between the upper and lower strata of



C, or Gamma.

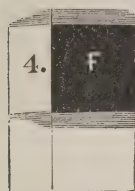


D, or Skidmore.



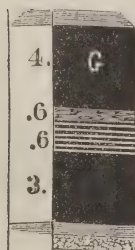
E, or Mammoth.

this great rock, which is a quartzite, and often a conglomerate rock, 80 ft. thick in the anthracite measures. It is sometimes accompanied by a stratum of white quartz secretions,



F, or Holmes

or conglomerate, even in the western portions of the field, which are often mistaken for water-worn pebbles. This is a great landmark in the Appalachian coal fields, which cannot well be mistaken, and yet it is often misplaced. Above this exists the group F, which consists of two thin impure beds, divided by a few inches of fire clay, known as the rough bed in the anthracite fields, where it is 5 to 7 ft. thick, and as a single bed in the Alleghany field, 1 to 2 ft. thick of slaty and sometimes 3 ft. of cannel coal. It seems to be a true horizon of coal, but is seldom found in merchantable quantity or quality. Above these are from 200 to 300 ft. of shales, slates, sandstones, and limestones, followed by the bed G, which is the large and celebrated Pittsburgh bed, remarkable for its production of excellent gas, coking, steam, and household coal, combining all the qualities of every variety of bituminous coal except the block and cannel. It ranges from 6 to 12 ft. in thickness, averaging from



G, or Primrose.

6 to 8. Between these great beds, E and G, exist from 300 to 450 ft. of unproductive strata, which contain no workable beds of coal. These are known in Pennsylvanian nomenclature as the lower barren measures, which are as distinctly marked in the anthracite as in the bituminous fields of this state. It may be briefly stated that all the coal beds and coal measures existing in the anthracite fields above G are found in some portions of the Alleghany field; but the coal beds are thin, rarely workable, and cannot be identified. From 1,000 to 2,000 ft. of coal measures are supposed to exist above G; but these are known as the upper barren measures, and are made up chiefly of shales, with a few coarse sandstones and massive limestones, one of which is 70 ft. in thickness, and is distinctly defined over a large area. The general average thickness of the coal measures between B and G is 1,000 ft., but varies from 500 to 1,200 ft. From the carboniferous limestone to B, including the groups O and A, the thickness of the strata is from 200 to 500 ft., and the total thickness of the coal measures about 3,000 ft. in Pennsylvania, with a minimum thickness of 30 ft. and a maximum of 50 ft. of coal.—The distribution of the deposits of coal in North America is well adapted for the supply of the wants of the present inhabitants. The largest population is along the Atlantic

coast, and the best coal, that of the anthracite fields of Pennsylvania, happens to be situated nearer the largest markets than any other, being less than 200 m. from New York and less than 100 m. from Philadelphia. The basins producing it are small, containing in all but 470 sq. m.; but the beds are very large and numerous, and the quantity produced is about half of all the coal mined in the United States. (See ANTHRACITE, LACKAWANNA, and WYOMING VALLEY.) In the eastern central part of Pennsylvania, where the anthracite basins are situated, great disturbances of the strata have taken place after they were deposited, caused by the gradual upheaval or subsidence of alternate portions in N. E. and S. W. lines, so as to throw them into a waving form. This disturbance was greatest toward the S. E., and the rock arches become wider and flatter as we go N. W.; but they extend S. W. entirely across this state and Maryland, and their effects are even seen in the coal field of eastern Ohio. All anthracite coal is found in regions where the strata have been considerably disturbed, or where from local causes it has been subjected to heat. Next westward from the anthracite in Pennsylvania the coal is semi-bituminous, and still further west it is of the ordinary bituminous character, the quantity of volatile matter constantly increasing toward the central part of the field. The carboniferous formation terminates in the northern part of Pennsylvania, and the division into counties of that district happens to correspond with six of the great flexures of the strata before mentioned, which give rise to six coal basins. Some of these from their far northern position contain some of the richest and most productive mines in the state. They produce, for the supply of the coalless country north of them, the variety commonly called Blossburg, which is used for steam and manufacturing purposes. The deposits of coal extend in this northern district along the middle or bottom of the basins only, in lines of small detached fields or chains of basins, which are more extensive as they are followed S. W. until they become uninterrupted prongs or finger points. Still further S. W. in Pennsylvania the lower beds arch over portions of the intermediate anticlinals, and in the S. W. part of the state, in the Pittsburgh country, the four or five lower beds which alone occur further N. disappear on the surface, dipping under a red and gray shale formation in which are no coal seams. Above these barren measures in the highest ground about Pittsburgh appears another bed of excellent coal, named after that city, from which all the coal is mined that is used in the S. W. part of the state, large quantities of it being also sent down the Ohio and Mississippi rivers. Pennsylvania not only supplies the United States with all the popular fuel anthracite, but she also produces more bituminous coal than any other state, of which she

has every variety of excellent qualities. The northern districts in 1873 produced 1,500,000 tons, and the eastern margin of the field

1,000,000 tons of semi-bituminous coal. Of the common bituminous coal 9,000,000 tons were mined in that year, chiefly in the Westmoreland and Pittsburgh districts and along the Monongahela and Youghiogheny rivers, for the supply of all the western states by way of the Ohio and Mississippi rivers, for gas making in the eastern cities, and for domestic and manufacturing purposes in the state. This is therefore the greatest of all the coal-producing states; and from its geographical position, its rich endowment of other minerals, and other natural advantages, there is every probability of its continuing to retain this position for a long time. The coal field which covers the eastern part of Ohio is the western border of that of western Pennsylvania. It stretches along the Ohio river from the Mahoning river on the north to near the Scioto on the south, from two to four counties in width, embracing 10,000 sq. m., being nearly as large as that of Pennsylvania, which has 12,774 sq. m. of coal. Along the N. E. border is found a peculiar splint or block coal, which has been used for many years in its raw state in blast furnaces; some small basins of it also occur on the Pennsylvania side of the line. Further south, in the Hocking valley, occurs a coal bed of extraordinary size, measuring in some localities 12 ft. in thickness, and it is said that it can also be used like the block coal. The production of coal has not been very large in Ohio (about 4,000,000 tons), but from the building of railroads, and the increase of population and manufacturing, the coal trade of the state is rapidly increasing. Maryland has a very small but very valuable basin of bituminous coal near the Baltimore and Ohio railroad, extending from near Cumberland to Piedmont in the western angle of the state. The production in 1873 was 2,674,110 tons, and since the opening of trade in 1842 the total production has been 24,027,786 tons. It is sold chiefly at New York for the use of ocean steamers and other steam purposes, is known as Cumberland coal, and is semi-bituminous; the bed is 14 ft. thick. West Virginia is almost wholly underlaid with bituminous coal, forming a portion of the same field above described in Pennsylvania, Ohio, and Maryland. The upper coal measures, including the Pittsburgh bed, extend over a large space in the N. W. part of the field in this state, along the Ohio river, as far south as the mouth of the Guyandotte. In the northern part of the state these upper coal beds are developed of good size and quality along the Baltimore and Ohio railroad and on the river about Wheeling. There are very fine natural exposures of the lower coal measures on the Kanawha river, from the great falls to Charleston. The display of coal in this district is very remarkable, and it has recently been made accessible by the completion of the Chesapeake and Ohio railroad. There are other very extensive districts in West Virginia, both N. and S. of the

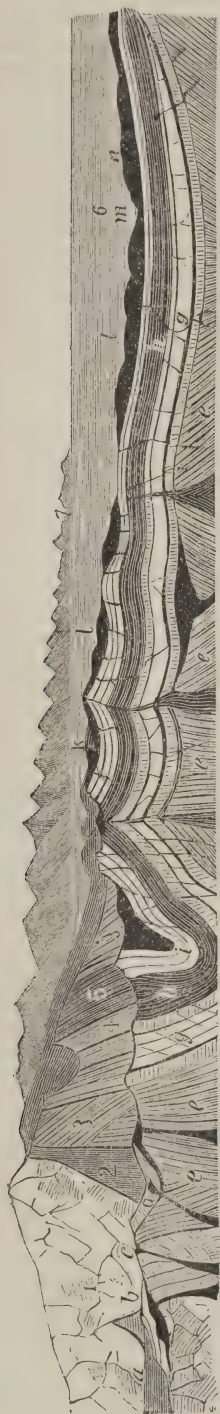


Fig. 5.—Appalachian Formations, Ancient and Modern.

REFERENCES: *Modern*.—*a*, the Atlantic sea; *b*, recent or cretaceous formations; *c*, granitic and volcanic; *d*, mesozoic, new red, &c.; *e*, metamorphic, gneissic, &c.; *f*, sandstones and limestones of the valley, or the lower paleozoic formations; *g*, slates and shales of the oil-producing formations; *h*, sandstones overlying the oil strata, including the old red and the conglomerate; *i*, the anthracite coal deposits; *k*, Cumberland coal field; *l*, *l*, *m*, Alleghany coal field; *m*, Ohio river.

The Potsdam sandstone underlies the Auroal limestone, *g*, and overlies the gneiss, *e*, which must exist to some extent in the entire basin. The dark vertical trap formations emerge from the granite, and were the means of forming the gneiss.

Ancient.—No. 1 corresponds to *a*, and is the granite seacoast line, forming the volcanic boundary of the ancient sea; 2 is a deep view of the volcanic vent between the granite and the gneiss, which is formed of the vented matter; 3 is the metamorphic or early gneissic sedimentary rocks; 4 corresponds to *g* and is the base of the paleozoic; 5 is the bituminous slates of the oil strata, followed by the massive sandstones of the old red, and the subcarboniferous; 6 is the ancient sea, since filled by the sedimentary deposits represented in *g*, *h*, *i*, *j*, *k*, *l*, &c.; 7 is the line of volcanic vents existing in the plutonic or granite coast line, which extends from Maine to Cuba. The form of the ancient structure is of course ideal, and the two views are thus given together in order to convey an impression of the cause and its effects.

Kanawha, where there is known to be a great abundance of excellent coal in localities to which no railroads have been built. There is little or no doubt of the identity of the coal beds throughout the states of Pennsylvania, Ohio, Maryland, West Virginia, and eastern Kentucky, which shows a wonderful sameness in distribution throughout all this vast territory. This coal field extends over the eastern part of Kentucky, and in the northern part of it in this state the Ohio and West Virginia coal beds of the lower series are found, but in the southern counties of the field only the subconglomerate coal beds appear. Very little development has taken place in this district, except on the Ohio river. Tennessee has an interesting and valuable coal field, which is coextensive with the table land of the Cumberland mountain, forming the western boundary of the valley of East Tennessee. In the more northern part of it the lower coal measures of the states further north seem to be found, but the great body of the field is composed of the coal beds still lower in the series which are found in West Virginia and eastern Kentucky. The conditions for coal making appear to have existed in the south earlier than further north; consequently coal is found in rocks which in the north are subcarboniferous and produce no coal. Alabama has the southern extremity of the great coal field we have been describing, divided into three separate portions called the Black Warrior, the Catawba, and the Coosa fields, containing in all 5,330 sq. m. Some of the best deposits of iron ore in America are east of and in the immediate vicinity of the coal fields of Alabama, Tennessee, and West Virginia, which at some future time will make this the seat of large iron manufactures. Thus far, however, but little has been done to bring into use these vast treasures of fuel. This first, Alleghany, or great eastern coal field of the United States, containing in all 58,737 sq. m., is by far the best and in all respects the most important in America.—When the first geological researches were in progress in the western states, it was supposed that the coal beds and the series of coal-bearing rocks were the same in Illinois, Indiana, and western Kentucky as in Pennsylvania, but it is now proved that they are entirely different and never were connected. The recent geological survey of Ohio shows that the great anticlinal axis which passes from Lake Erie past Cincinnati and through the eastern parts of Kentucky and Tennessee is much older than the coal-making age, and that the coal fields of Michigan and Illinois were always separated by it from that of Ohio. The peninsula of Michigan contains a coal field of 6,700 sq. m., extending from Jackson to Saginaw bay, but the coal-bearing rocks are only about 100 ft. thick, and contain but one bed of coal of about 3 ft. or less of coal of a bad quality, full of sulphur and other impurities, and the annual production is small. The ma-

terials of its rocks were derived from the north. The third great coal field covers 6,500 sq. m. in the western part of Indiana, 36,800 sq. m. in Illinois, and 3,888 sq. m. in the western part of Kentucky. The best coal produced in this field is from Indiana, where along the eastern border of it there is a good quality of block coal for furnace use, and some common bituminous coal of fair quality. The Illinois coal is all much inferior to that of Pennsylvania and Ohio, contains a portion of hygrometric moisture which lessens its heating power, and considerable sulphur and other injurious impurities. Notwithstanding this, it is invaluable to the state, which is almost wholly a prairie country, mostly level, destitute of trees, covered in a state of nature with tall coarse grass, and with an extremely fertile soil. The want of fuel of any kind would have been a great disadvantage; and inferior as it is, considerable quantities are annually produced in many parts of the state, especially opposite St. Louis and near other large places. The portion of this field extending into western Kentucky is believed to contain better coal than that of Illinois, and it now produces moderate quantities from mines near the Ohio river.—The fourth great coal field lies west of the Mississippi river, in western Iowa, southeastern Nebraska, northern Missouri, eastern Kansas, the Indian territory, and western Arkansas, and possibly it underlies the cretaceous formation which on the surface separates it from the Texas coal at Fort Belknap; it contains in all nearly 80,000 sq. m. The deterioration westward of the coal continues over this field also, there being fewer and thinner coal beds and coal-bearing rocks, the latter becoming gradually converted into vast beds of limestone, and the shales and sandstones among which coal is usually found becoming subordinate. The best and most productive portion of this field is the district in Iowa along the Des Moines river. In S. W. Iowa and N. W. Missouri, in Nebraska, and the western border of the field in Kansas, the upper coal measures, a great limestone formation very similar to the subcarboniferous limestones below the coal, comes in, containing only one or two very thin beds of coal about one foot thick. The middle coal measures are but little better, the valuable coal beds all being found in the lower coal measures. On the Des Moines river are some beds of fair size, and there is a considerable production. In Missouri, where the lower coal measures are exposed in a district containing 12,420 sq. m., extending from the Iowa line in the N. E. part of the state S. W. across the Missouri river to the Kansas line near Fort Scott, there are workable beds from 2 to 3 ft. thick, and in the absence of better fuel there is local demand for a considerable quantity of the production. This productive coal belt extends into the S. E. corner of Kansas, whereas in the other parts of the state where the coal extends the seams near the

surface are only about one foot thick. The dip of this coal field is toward the northwest, and on its western border Permian fossils are found, this being the only locality where that formation has been found on this continent. —According to the United States census, the statistics of coal production for the year ending June 1, 1870, are as follows: Number of collieries, 1,566; hands employed under ground, 65,000; above ground, 29,854; total, 94,754; capital employed, \$110,008,029; wages paid, \$44,316,491. Bituminous coal mined, 17,199,415 tons; value, \$35,029,247. Anthracite coal mined, 15,664,275 tons; value, \$38,495,745. Total coal mined, 32,863,690 tons; value, \$73,524,992. The distribution of the production of coal in the United States in the chief coal-producing states is shown in the following statement from the census of 1870. Except in the case of Pennsylvania, the production is bituminous coal:

STATES AND TERRITORIES.	No. of collieries.	Capital invested.	Tons produced.	Value of product.
Alabama.....	2	\$26,000	11,000	\$39,000
Illinois.....	322	4,288,575	2,624,163	6,097,432
Indiana.....	46	554,442	437,870	988,621
Iowa.....	96	618,332	293,457	874,334
Kansas.....	20	166,430	32,938	114,278
Kentucky.....	80	717,950	150,552	446,792
Maryland.....	22	23,891,600	1,819,824	2,409,208
Michigan.....	3	176,500	28,150	104,200
Missouri.....	56	2,587,250	621,930	2,011,820
Ohio.....	307	5,891,813	2,527,285	5,482,952
Pennsylvania.....	588	67,911,703	23,445,793	52,357,814
Anthracite.....	227	50,922,285	15,650,275	39,422,775
Bituminous.....	361	16,989,418	7,795,518	12,935,039
Tennessee.....	11	313,784	133,418	330,495
Utah.....	6	44,800	5,800	14,950
Virginia.....	6	779,200	61,803	221,114
West Virginia.....	41	1,434,800	608,873	1,085,862
Wyoming.....	1	250,000	50,000	800,000

The total production of coal in the United States in 1873 was as follows:

STATES AND TERRITORIES.	Sq. miles of coal.	Tons.
Pennsylvania.....	12,774	34,522,560
Maryland.....	550	2,674,100
Virginia.....	185	60,000
West Virginia.....	16,000	1,000,000
Ohio.....	10,000	3,944,340
Eastern Kentucky.....	8,963	50,000
Western Kentucky.....	3,888	350,000
Tennessee.....	5,100	400,000
Alabama.....	5,330	60,000
Michigan.....	6,700	50,000
Indiana.....	6,450	1,500,000
Illinois.....	36,800	3,500,000
Iowa.....	18,000	350,000
Missouri.....	23,100	1,000,000
Kansas.....	17,000	50,000
Colorado, Wyoming, Utah, &c.—lignite.....	.....	500,000
Pacific coast—lignite.....	.....	500,000
Total.....	.....	50,512,000

The area of the New Brunswick coal field is very large, but there is only one thin coal bed, too small to work. Nova Scotia produced 411,541 tons of coal in 1873, and Cape Breton island 639,926. The coal is all bituminous and of a

fair quality for gas and steam purposes. There is also an unproductive anthracite coal field in Rhode Island and Massachusetts.—The foregoing fields comprise all the carboniferous coal in North America, and it is not probable that any other districts of any extent containing true coal will hereafter be discovered. Near Richmond, Va., is a very deep coal basin of the triassic age, which was the first worked in the eastern states, and after a long suspension work has lately been resumed. There are two other similar small basins in North Carolina, on Deep and Dan rivers, but neither of them is wrought.—Besides the foregoing carboniferous and triassic coal fields, there is in the N. W. part of this continent a very large area of coal fields which should be described with some detail. The coal or the combustible matter of these western basins is of the kind generally called lignite, of an inferior quality and of a more recent age, the tertiary. It has however the same appearance, and is by its chemical composition true coal; and its distribution in extensive basins along the eastern base of the Rocky mountains, bordering immense treeless plains where no other combustible of any kind can be found, gives to these coal fields an immense value. Indeed, in regard to the population of the gold-mining countries of the Rocky mountains, and to the building of railroads across the plains from the Missouri to the Pacific, the lignitic basin of the west is for the future as important as are for the present the Appalachian coal beds or the coal fields east of the Mississippi river. Along the Missouri river and west of it, the true carboniferous formations sink and disappear under the Permian. The line of the 96th parallel of longitude, from the point where it enters the state of Iowa to the southern limits of Kansas, shows nearly exactly the limits of the old coal fields. Further west the Permian, following a gradual westward dip, is overlaid by the cretaceous formations, which reach a thickness of 2,500 ft. or more; and over these, nearer to the mountains, the tertiary measures appear with their numerous and as yet scarcely explored beds of lignitic coal. By the upheaval of the Rocky mountains, the lower tertiary has been thrown up, sometimes to the perpendicular all along the base of the mountains, and there the capacity of some of its beds of coal has been exposed and is already utilized by workings on a comparatively large scale. The whole lignitic basin may be, like the coal fields of the east, subdivided into different basins, not by any positively marked difference in the nature and composition of the lignitic coal or by any difference whatever in the formation of their coal beds, but merely by geographical limitation, as follows: 1. The New Mexico lignitic basin. It is especially of great extent and rich in coal beds along the Rio Grande, on both sides of it, S. of Santa Fé and Albuquerque as far down as Fort Craig, the supply of fuel for the fort being obtained from

a bed of lignite $5\frac{1}{2}$ ft. thick, 5 m. E. of Don Pedro. A number of other valuable beds have been reported near San Felipe, and still more abundantly northward, around Santa Fé and up to the Raton mountains. The coal of Placiere mountain, which is partly anthracite, is 5 to 6 ft. thick. The following section, taken at the foot of the Raton mountains, shows the average distribution of the lignitic formations of this southern basin:

	Ft. in.		Ft. in.
1. Sandstone and shale, space covered....	60 0	7. Hard sandstone in bank.....	6 0
2. Soft shale and clay.....	85 0	8. Soapstone shale....	2 0
3. Outcrop of lignite showing.....	2 0	9. Lignite, outcrop, good.....	2 0
4. Soft shale and fire clay.....	26 0	10. Fire clay and shale.	36 0
5. Outcrop of lignite, thin.....	1 0	11. Lignite, exposed....	2 6
6. Hard gray shale with fossil plants.....	30 0	12. Fire clay.....	6 0
		13. Soft shale.....	30 0
		14. Lignite bed opened.	4 0
		15. Ferruginous and shaly sandstone..	50 0

This section rests upon a series of hard coarse sandstone, remarkably mixed with fragments of marine weeds and pieces of bark and of wood, marking this formation as the result of marine deposits along the shores. This, like the alternation of the strata marked upon the above section, especially the deposits of fire clay under each bed of lignite and of shale and shaly sandstone above, gives to the distribution and composition of the lignitic strata an evident likeness to those of the old carboniferous measures. From Trinidad or from the Raton northward to the Spanish peak a number of coal beds have been reported from the same basin as far north as Chicosa, 20 m. from Trinidad. The coal of this country is of a remarkably good quality, some being compact enough to furnish hard coke by distillation, and others producing by the same process a large proportion of illuminating gas. 2. The Colorado lignitic basin, from Pueblo to Cheyenne, covers a wide field, but is to the south at least broken into small isolated areas. One is in the Arkansas valley, E. of Cañon City, with beds of excellent coal, varying from 6 in. to 8 ft. A small basin E. of Colorado Springs has as yet given mere indications of coal in thin beds of 2 to 3 ft. But further north, and from the North fork of Platte river to Cheyenne, the lignitic measures follow the base of the mountains nearly without interruption, furnishing an abundance of fuel to the already large population of the country and to the railroads. Beds of lignite have been opened near the cañon of the South Platte, 5 ft. thick; then in a continuous direction northward, near Green mountain, 7 ft. thick; and at and around Golden, from 4 to 11 and even 14 ft. thick. Five miles N. of Golden, on the Ralston creek, a coal vein is worked averaging 16 ft. in thickness without any parting. Still further N. toward Marshall's a number of beds have been tested varying in thickness from 5 to 9 ft.; and at Marshall's numerous beds have been tested and some worked, varying in thickness from 4 to

11 and 14 ft. Beds of the same kind and of equal thickness are worked still further N. and E. on Boulder creek, Erie, Thomson creek, and Cache la Poudre river. Thus the continuity of the basin appears to be ascertained from the North Platte to near Cheyenne. In width the measures appear to be continuous from the base of the mountains to the Platte, about 15 m. from W. to E. There they pass under more recent formations, and of course may be reached by shafts further E. It is to be remarked, however, that the coal becomes less compact and therefore more subject to disintegration by atmospheric influence, and even liable to spontaneous combustion, in proportion to the distance from the base of the mountains. 3. The lignitic basins along the Union Pacific railroad from Cheyenne to Evanston. On this line the first lignite basin is exposed at and around Carbon. It is of small area, but its beds are thick and the coal of good quality. From Carbon, over lower formations, the railroad passes to a new tertiary and lignitic basin with some thin beds exposed, at Creston, Washakia, &c., and then to a rich productive lignitic region in entering Bitter creek and following it from Black Butte to Rock Spring. At Black Butte three beds of coal are exposed, one of which is worked 8 ft. thick. At Rock Spring an upper coal of excellent quality is worked near the surface, 8 ft. thick, and a lower coal, equally good but only 4 ft. thick, is worked 2 m. E. of the village. A boring made at Rock Spring for the purpose of obtaining fresh water has exposed the remarkable development of the tertiary measures in this country. Below the main coal the record of the boring indicates 41 ft. of lignite in 700 ft. This is about the same amount of coal indicated at Marshall's in a section of about 500 ft. of measures. From Rock Spring to Evanston, a distance of 130 m., an upper tertiary formation, mostly of shale, overlies the lignitic. It has no coal; but some of its beds of shale are so bituminous that in some localities they are worked and used for fuel. Evanston and Coalville are the two last localities where lignite beds have been opened for the use of the Union Pacific railroad. At Evanston the Wyoming coal company works the bed 14 ft. thick, interlaid by three slate partings of a few inches each. The Rocky mountains coal company, adjoining the first, has the same bed of a greater thickness, 43 ft., interlaid with numerous beds of clay and shale. This lignite bed is comparable in its productiveness to the great mammoth bed of the anthracite of Pennsylvania. It however occupies a very limited area. The Coalville beds, at a short distance from Evanston, have been considered by some as identical with the Evanston deposits, and by others as from an older formation, the upper cretaceous. The northern lignitic basin was the first discovered and recorded in the history of the United States. It is however far less known than the others, being as yet out of the lines

of travel and emigration. The so-called lignitic formations were first noticed in Lewis and Clarke's expedition to the Rocky mountains while ascending the Missouri river in 1804. The coal was observed by them at various points from above the Mandan village in ascending the river for a distance of 990 m., and along the Yellowstone river in descending it from about lat. 45° to its mouth, lat. 48° 20'. More recent expeditions in the same country, especially the surveys of Profs. Meek and Hayden, have recorded the same wide extent of area of the N. W. lignitic field and the richness of its coal products. Dr. Hayden in 1857 published a map with sections of the country bordering the Missouri river, accompanied by explanations and documents of the highest scientific interest. This work embodies the results of three years' explorations by the author in the northwest. It marks the outlines of the northern lignitic basin on both sides of the Missouri from below Fort Clark to the Muscleshell river, the northern limit marked by British America and the southern by the head waters of Cherry creek and the Black Hills, narrowing between the Black Hills and the Big Horn mountains, and descending further south to the North fork of the Nebraska river. The author estimates the area of this basin at 400 m. in length and 150 m. in width, or about 60,000 sq. m., which estimate however he rightly considers too low. The most important localities on the Pacific coast where lignitic coal has been produced are Mount Diablo near San Francisco, Coos bay in southern Oregon, Seattle on Puget sound, Bellingham bay in Washington territory, and Vancouver island. It is also found in Alaska and elsewhere, and there is anthracite on Queen Charlotte's island.—Measured by the amount of their annual production, the most important coal fields out of the United States are those of Great Britain, which produce about one half of all the coal mined in

the world. The whole quantity of coal produced in the kingdom since it was first used in the country is estimated at 4,672,090,988 tons, of which the production of the year 1873 was 127,016,747 tons; 86 per cent. of the production of that year was from England, and the anthracite was less than 1,000,000 tons. The quantity of available unmined coal has been ascertained by a royal commission. The resources of coal in the kingdom, amounting to 90,207,000,000 tons in 1871 according to this report, are generally thought to be exaggerated by including the small seams down to one foot in thickness and those below 3,000 ft. in depth, which is probably as deep as coal can be mined, instead of 4,000 ft., as given in the report. The South Wales coal basin has the largest area and much the largest quantity of unmined coal, about 36 per cent. of the whole, but the largest production is from Durham and Northumberland, or the Newcastle coal field. The quantity of coal in Scotland is comparatively small, and in Ireland unimportant. Great Britain exports about 13,000,000 tons annually, and has for many years supplied the world with vast quantities of manufactured articles made with the aid of her coal. The following tabular statements contain much important, useful, and accurate information. The coal produced in 1873 was used and disposed of as follows:

DISPOSITION OF COAL.	Tons.
In the manufacture of iron.....	25,119,709
In steam power in manufactories.....	27,550,000
Domestic or household consumption.....	20,054,000
Exported to foreign countries.....	12,712,222
Used in mines and collieries.....	9,500,000
In the manufacture of gas.....	6,560,000
In steam navigation.....	8,650,000
In glass works, potteries, and brick and lime kilns	3,450,000
On railways.....	3,790,000
In chemical works and all other manufactures..	3,217,229
In smelting other metals.....	763,667
In water works.....	650,000
Total production of Great Britain in 1873....	127,016,767

STATISTICS OF THE COAL FIELDS OF GREAT BRITAIN.

NAMES OF COAL FIELDS.	Square miles of coal.	Thickness of coal-bearing strata.	No. of beds of coal.	Thickness of coal.	Millions of tons within 4,000 ft.	Tons of coal produced in 1873.
Durham and Northumberland.....	460	2,030 ft.	16	46 ft.	10,037	29,640,397
Cumberland.....	25	2,000	9	36	405	1,749,036
Yorkshire.....	760	4,500	15	46	18,248	15,811,778
Derbyshire and Nottinghamshire.....						
Warwickshire.....	30	2,950	5	20	458	11,568,000
Leicestershire.....	15	2,550	10	45	839	
Lancashire.....	217	6,000	3	62	5,546	17,060,000
Cheshire.....						
Shropshire and Anglesea.....	9	1,809	8	36	5	1,570,000
N. Staffordshire.....	75	5,000	30	150	3,825	3,892,019
S. Staffordshire and Worcestershire.....	93	1,810	6	65	1,906	9,468,559
North Wales.....	47	3,000	7	30	2,005	2,450,000
South Wales.....	906	12,000	25	84	32,456	9,841,523
Monmouthshire.....						
Forest of Dean.....	34	2,765	8	22	265	4,500,000
Bristol.....	150	5,125	20	71	4,218	
Total of England.....	2,821	.....	..	..	80,208	110,055,553
Scotland.....	.....	.....	..	..	9,843	16,857,772
Ireland.....	.....	.....	..	..	156	103,423
Total Great Britain.....	.....	.....	..	..	90,207	127,016,747

—France has a large number of small detached coal basins. The basin of St. Étienne, in the department of Loire in S. E. France, has the largest annual production, about 3,500,000 tons; the basin of Valenciennes in the north, an extension into France of the coal field of Belgium, produces nearly as much, and that near Calais almost 3,000,000 tons. These and three or four others in S. E. France, each yielding about 1,000,000 tons per annum, produce the bulk of the coal of that country. The whole production of France in 1872 was 15,899,005 tons, and in 1873 about 17,500,000 tons. The annual production of anthracite is about 1,000,000 tons. The following tables give the most important statistics in regard to them, derived from the report of a late French parliamentary commission in 1874:

KINDS.	No. of concessions.	AREA.		PRODUCTION.	
		Square miles.	Per cent.	Tons in 1872.	Per cent.
Bituminous	319	1,527	52	14,459,273	90.94
Anthracite	146	221	24	1,006,525	6.38
Lignite	147	338	24	433,807	2.73
Total	612	2,086	100	15,899,005	100

PROPORTION OF WORKED AND UNWORKED TERRITORY.	Square miles.	CONCESSIONS.			
		Bitum.	Anth.	Lignite.	Total.
Worked	1,434	204	74	57	335
Not worked	652	115	72	90	277
Total	2,086	319	146	147	612

Germany is the largest coal-producing country in continental Europe. In 1872 the coal production of the empire was 42,324,466 tons, of which Prussia proper produced 36,973,411 tons; and there was a considerable increase in 1874. Less than one fourth of the whole product, 9,018,048 tons, is lignite or brown coal. The largest production was in the Rhine provinces, 11,500,000 tons; Silesia, 10,500,000; Westphalia, 10,000,000; and Saxony, 9,500,000. About two thirds (6,139,851 tons) of the brown coal comes from Saxony, where also about 3,000,000 tons of true or carboniferous coal is mined. Belgium is the next in rank as a coal-producing country, having mined 15,658,948 tons in 1872; the two principal districts are those of Liège and Hainaut. Austria mined 10,389,952 tons in 1872, more than half of which (5,676,672 tons) was brown coal. Nearly half of the whole product (5,098,080 tons) came from Bohemia, 1,500,000 from Hungary, and nearly as much from Styria. Nearly all the provinces produce both black and brown coal, or carboniferous coal and lignite. Russia has a large coal area, which like that of Scotland is subcarboniferous, or situated geologically below the formation in which the best coal of England and America is found. The only coal field of Russia belonging to the true coal formation is a small tract in Poland containing

80 sq. m., producing one third of the whole amount mined, which was 1,097,832 tons in 1872. Some good anthracite is reported near the sea of Azov, of which 331,896 tons were produced in 1872. Russia also produced in the same year 27,586 tons of lignite and 738,350 tons of bituminous coal. Spain has a good coal field of the carboniferous age, measuring 3,501 sq. m., but the production was only 570,000 tons in 1872. There is also coal in Portugal, the production in 1872 being 18,000 tons. The coal of New South Wales in Australia is believed to be true coal or carboniferous, not a lignite. The amount mined in 1873 was 942,510 tons, but the product does not increase rapidly, as it was 919,522 tons in 1869. The coal in Italy is lignite or later than the carboniferous age, as is also that of India, covering an area of 2,004 sq. m., and those of China, Japan, New Zealand, and South America, except some true coal in Brazil.

COAL PRODUCTION OF THE GLOBE.

COAL-PRODUCING COUNTRIES.	Sq. miles of coal.	Year.	Production in tons.
United States	192,000	1873	50,512,000
Nova Scotia	18,000	"	1,051,567
Great Britain	11,900	"	127,016,747
France	2,086	"	17,500,000
Belgium	900	1872	15,658,948
Germany	1,800	"	42,324,466
Austria	1,800	"	10,389,952
Russia	30,000	"	1,097,832
Spain	3,501	"	570,000
Portugal	"	"	18,000
Australia	"	"	942,510
India	2,004	"	500,000
Chili, China, Japan, New Zealand, and all other countries (estimated)	"	"	1,000,000
Total	"	"	268,582,022

—The early history and development of coal is very obscure. It appears to have been used by the ancients only to a limited extent. Theophrastus, in his treatise on stones, mentions *lithanthrax* as used by the smiths of Elis. But the Romans, who excavated several of the ancient aqueducts of France through the coal measures, developing beds of coal, paid no attention to the mineral. The first notice we find in official records of the development of coal in England, the first country in which the mining of coal became a commercial industry, is the receipt of 12 cart loads of "fossil fuel" by the abbey of Peterborough in 850. But evidences exist to prove that coal was used to a very limited extent by the Britons before the Roman invasion; and the discovery of tools and coal cinders near the stations on the Roman wall, indicates that they must have learned its use from the Britons. The first evidence, however, of regular mining operations is found in the books of the bishop of Durham, by whom in 1180 several leases were granted for mining "pit coal," a term since common among the English miners and writers on coal. The coal of Belgium appears to have been developed

about this time, or during the 12th century, near Liège. It is said that a smith named Houillos first used coal in the village of Plénevaux, near that place, about this time, and in commemoration of this discovery the French name of coal is *houille*. Coal was first used in London in 1240; and in 1300 considerable quantities were made use of. A tax of from 1s. to 10s. per chaldron was imposed on coal in England during 400 years, ending in 1803. The first attempt to make pig iron with pit coal appears to have been in 1612, when a patent for this purpose was granted to Simon Sturtevant, but it was unsuccessful. Dudley also obtained patents in 1619 for the same purpose, but also failed, and was imprisoned for debt in consequence. The first successful effort appears to have been made by Mr. Darby of Coalbrookdale in 1713; and in 1747 cast iron suitable for cannon is said to have been made at this place, both the coal and iron ore used being taken from the same mine. In 1700, 64 furnaces were in blast in the forests of England, producing about 20,000 tons of pig iron annually; in 1788, only 13,000 tons of charcoal iron were made, and 61,300 of pit coal or coke iron; but during 1870, 5,963,515 tons were made with coke and coal. The aggregate steam power of Great Britain in 1860 was 38,635,214 horse power, equal to the productive laboring force of 400,000,000 men, or twice the power of the adult working population of the globe. Nothing more striking or instructive, in regard to the value of coal when utilized by an industrial community, could be stated than this fact.

COAL PLANTS. The vegetation of the globe during the different stages of its formation has undergone very great and evident changes. There is however no reason to doubt that the fossil plants known from the different formations of our earth may all be referred to the great classes of the vegetable kingdom distinguished at the present day, viz.: the thallo-gens, including such plants as lichens, algæ, and fungi; the acrogens, such as ferns and lycopods; the gymnosperms, such as cone-bearing plants and cycads; the endogens, such as palms, lilies, and grasses; and the exogens or dicotyledons, to which belong most of our species of trees. Though the distribution of vegetable fossil remains in these great classes is easily and truly recognized, their relations to genera and species are by no means so certain. What has been said of the formation of coal and its distribution at different geological periods (see COAL) shows that the examination of the coal floras should not be confined to the vegetation of the carboniferous period. But this limitation is admitted here, for the reason that the fossil flora of the carboniferous is more important in its study and is better known than that of any other epoch, and that its essential characters have been recognized

in the contemporaneous floras over the whole world. Moreover, the essential facts concerning the floras of the periods subsequent to the carboniferous measures have been touched upon already.—The plants of the true carboniferous period are mostly, if not all, referable to the class of the acrogens or vascular cryptogams: ferns, lycopods or club mosses, and *equisetaceæ* or the horsetail family. A very few species have been considered as belonging to phænogamous gymnosperms: the conifers by 12 species known only by the structure of fossil trunks which represent them; the *cycadeæ* by so-called species of *Noeggerathia*, all

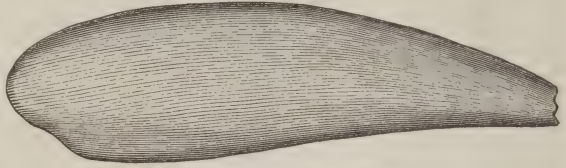


FIG. 1.—*Flabellaria borassifolia*.

except one, *N. foliosa*, of uncertain relation, and by the very common *flabellaria* or *Cordaites borassifolia*, mostly represented like *Noeggerathia* by long ribbon-like leaves only. One stem of it has been found in a silicified state and analyzed by Corda, who considers the plant as allied by its structure to the lycopodiaceous and to the *cycadeæ*. The true place of these leaves in the vegetable scale is therefore not positively ascertained.—It is a remarkable fact that trunks of conifers, or those referable to this family by their structure, have been found in the upper Devonian and the subcarboniferous measures of the United States, but that as yet no remains of this kind have been discovered in the true coal measures above the millstone grit. A splendid specimen from the upper Devonian of Indiana, a stem half a foot in diameter, has its surface fluted exactly like that of a *calamites*, while its internal structure is related to that of *araucaria*.—The ferns have the most abundant species of the carboniferous period; already more than 600 have been described from this formation. Of these, about 200 species have been found in the coal fields of the United States, more than 50 of which appear to be indigenous or have not till now been observed in Europe. They represent either distinct peculiar types or some analogous ones which are distinguished by less appreciable characters, and which may perhaps be eliminated by comparison with European specimens. As now known, the North American coal flora presents differences evident enough to impress it with a distinct American character, while on the other hand the numerous identical species show it to be as positively representative of the same period as that of the European or other carboniferous floras. The determination of the species of ferns of the coal measures is rendered difficult and somewhat uncertain, at least in regard

to their relation to living species, by the absence of fructifications, which essentially serve



FIG. 2.—1. *Neuropteris hirsuta*. 2. *Adiantites Lindseiformis*.



FIG. 3.—1. *Sphenopteris tridactylitis*. 2. Leaf enlarged.

as characters for their classification. In the fossil specimens, the nervation, which is generally well preserved and distinct, together with

the form of the fronds and of their divisions, the pinnae and pinnules or leaflets, are the only appreciable characters for the determination and even the general classification; as for example that of Brongniart, the oldest, simplest, and most comprehensible of those which have been attempted. It admits four general divisions: 1. *Neuropterideæ*. Frond simple or with compound leaflets free or adhering, without middle nerve or merely with a middle nerve at the base, disappearing upward; veins dichotomous or flagellate. 2. *Adiantideæ*. Frond pinnate, bipinnate, or tripinnate; leaflets narrowed to the base, flabel-



FIG. 4—*Pecopteris louchitica*.

liform, entire or scarcely lobed; veins diverging from the base, without a distinct middle nerve. 3. *Sphenopterideæ*. Fronds of the same kind; veins pinnate or bipinnate near the base; secondary divisions very oblique. 4. *Pecopterideæ*. Fronds simple, pinnate or bipinnate, the leaflets generally adhering by the whole base, or often joined (confluent) at or near the base, then forming lobes, entire or denticulate; secondary veins pinnate, dichotomous or reticulate.—This general classification is still used as a commodious frame for establishing a large number of subdivisions, though many other systems have been proposed since. Among others, the two more important are that of

Göppert, established in his *Genera*, where he especially considers fructifications, and that of Ettinghausen, which fixes with great detail the character of the groups and their subdivisions from similarity of nervation. These different systems are interesting to palæontologists, but present all the same insufficiency resulting from the difficulty of observing the fructification, or from the similarity of the nervation in different species or even genera. Five or six genera of living ferns, for example, exactly limited by the characters of their fructifications, all present in some of their species the same kind of nervation. It is worth remarking, however, that the fossil ferns of the carboniferous measures are in this country more generally found in fruiting specimens than in Europe. The same remark may be applied to the trunks of fern trees, whose scarcity has been generally remarked in Europe as a fact seemingly in contradiction with

in. in diameter, and almost exactly cylindrical. Generally, however, in connection with the roof shale of coal beds, the ferns are mostly bushy or herbaceous species, the shale being composed of soft muddy materials, forming a ground too unstable for the vegetation of large trees.—The

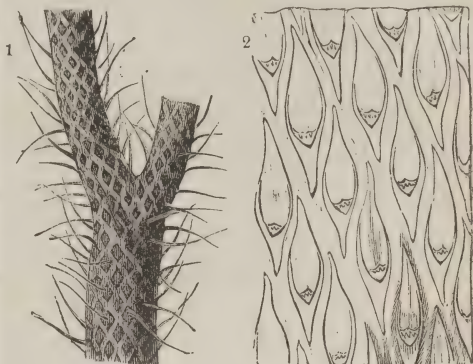


FIG. 6.—1. *Lepidodendron*. 2. Scars of a larger branch.



FIG. 5.—*Caulopteris Worthenii*.

what should be expected in considering the great size of the other kinds of vegetables of the carboniferous period. In the coal measures of the United States, these trunks of ferns, named *caulopteris*, *stemmatopteris*, *psaronius*, &c., and generally classed by the characters of their internal structure or by the scars of leaves upon the bark, are not rare, indeed are extremely abundant in some localities. In southern Ohio and northern Virginia, trunks of ferns are imbedded in a thick bed of sandstone occupying a wide area. These trunks, mostly silicified, are either standing or prostrated, and their fragments are now strewn along the creeks, which by their course through this region have taken off and displaced these remains. They are not only in great number, but some of them are large. The average diameter is 8 in., but some measure more than a foot. A splendid specimen in the museum of comparative zoölogy at Cambridge is 2 ft. high and 14

club moss or lycopod family is represented in the carboniferous formation mostly by large trees and floating stems, also proportionately large. They belong to several genera, of which the more remarkable are the *lepidodendron*, *sigillaria*, and *stigmaria*. These genera are mostly characterized by the impressions of the leaves forming at the point of attachment rhomboidal, oval, or round scars, which, small in young branches and young stems, enlarge after the fall of the leaves in proportion to the growth of the trees. In species of *lepidodendron* these scars are placed spirally along the trunk and contiguous to each other. In the small branches or immediately after the parting of the leaves these scars are scarcely half a line in diameter on each side; in old trees of the same species the scars are an inch and a half long

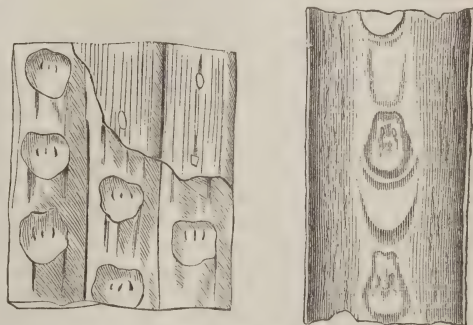


FIG. 7.—*Sigillaria*.

and an inch broad. They form either surface or flat impressions, or are more or less deeply cut into the bark. The *sigillaria* species differ essentially from the *lepidodendron* by the position of the scars, which are placed in vertical rows separated by convex or flat

ribs, and generally at a distance from each other. The form of these scars is extremely variable, and, as in *lepidodendron*, their size enlarges in proportion to the growth of the trees. The identification of the species is therefore very difficult, especially when it has to be made, as is generally the case, from fragmen-

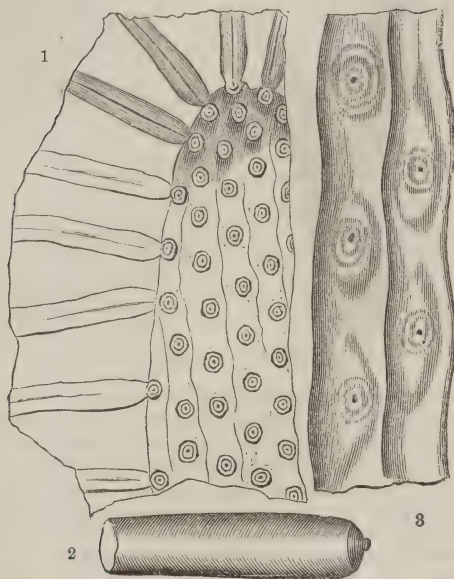


FIG. 8.—1. Stigmara with leaves. 2. Stem of Stigmara with scars. 3. Leaf of Stigmara.

tary specimens. It is rendered still more embarrassing by the fact that the bark of some species of sigillaria is composed of different thin layers, easily separated, on which the leaf scars, though superposed, differ upon each layer. The club mosses of our time rarely have stems half an inch in diameter; those of the coal, or the *lepidodendron* and *sigillaria*, were represented by trees sometimes 2 ft. in diameter and 40 to 60 ft. high. The *stigmara* are comparable to the *sigillaria* by their texture; but they were merely floating stems, which, suspended in water by long hollow leaves, had a mode of life independent from that of their flower- or fruit-bearing stems, the *sigillaria*, *lepidodendron*, &c., which came out only when a kind of ground had been formed and consolidated by the growth of the *stigmara*. The connection of these floating stems with trunks of *sigillaria* and of *lepidodendron* has disposed many palæontologists to consider them as mere roots. But besides many other considerations, the fact that these *stigmara* did live independently and for long periods without any *sigillaria* stems, even forming by their debris thick strata of clay, is a sufficient reason for recognizing them as true stems. In the peat bogs of our time there is a small club moss, *lycopodium inundatum*, which in a di-

minutive way shows us the mode of life of those *stigmara*. It expands all around upon the soft muddy surface of the bogs, its creeping stems interlaced in every direction; and when the carpet has become solid enough, the flowering stems come up and ripen their seeds out of reach of the water. The *stigmara* trunks do not vary much in size from 2 to 4 in. in diameter, but they indefinitely extended their branches by forking, and with their long leaves formed a floating network, soon solid enough to support large trees. The same result is now produced in our peat bogs by the vegetation of the floating mosses. All the scars left at the point of attachment of the leaves of *stigmara* upon their stems are almost exactly round, like a swollen convex surface one and a half to two lines in diameter, surrounded by a ring and pierced in the centre by a point, the scar of a vessel. The relative position of the scars is more generally in quincuncial order, at a distance of an inch or less; they are sometimes connected by star-like wrinkles, or separated in undulate rows by narrow ridges. The fruits of the lycopodiaceous species of the carboniferous, *lepidostrobus*, are in the form of seeds enclosed in receptacles or spore cases in right angle to a common axis, and forming cones covered with imbricated scales. Their form and arrangement are like those of the club mosses, but the size of the cones is proportionate to that of the trees.

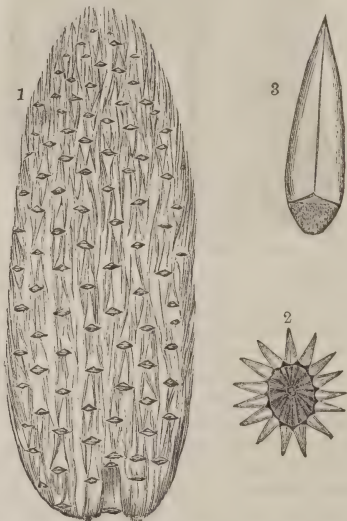


FIG. 9.—1. *Lepidostrobus*. 2. Cross section of a small species. 3. Sporangium and blade of *Lepidostrobus*.

They vary from 1 to 2 in. in diameter, and from 2 to 18 in. or more in length.—The *calamites*, which have left very abundant remains in the coal, are closely related by their hollow articulated stems with bark vertically and equally fluted, by their fructifications, and by their structure, to living species of *equisetum* (horse-

tail). But they have the same enormous proportions in size as remarked for *lepidodendron* and *sigillaria* compared with club mosses. Their trunks vary from 1 to 6 in. in diameter, their length from 6 to 40 ft. They appear to have grown close together and in thickets, at least in some localities; for example, near Carbon-

formation of a bed of coal, and of the strata which separate it from the one above it, has demanded a long period of time, sufficient to modify somewhat the characters of the vegetation. It seems therefore that it might be easy to remark and point out the difference between the plants of two subsequent beds of coal. The miners in general appreciate this difference, and indeed it is usually an easy matter for a palæontologist to remark it when his observations are limited to the same locality. But the study is rendered very difficult by the variations in the distribution of the plants as remarked in the same bed at distant localities. The variability acting in two ways, horizontally and vertically, the result of its force in one way or the other can be appreciated only from long researches. In the coal fields of the United States, *lepidodendron* spe-

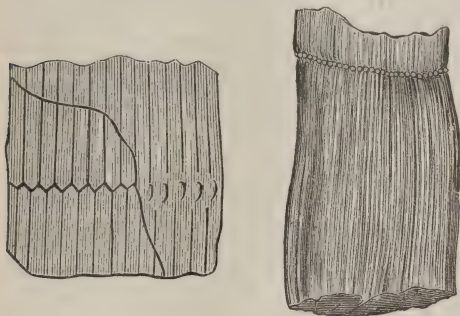


FIG. 10.—*Calamites*.

dale, Pa., such forests of *calamites* are seen petrified, standing and imbedded in sandstone, their trunks in close proximity to one another. The branches of *calamites* bear whorls of linear narrow leaves, which have been described as *asterophyllites*. Their fruits, *Wolkmannia*, are cones bearing seeds like those of species of *equisetum*, merely differing by the presence of scales and imbricated in rows. Two other genera, represented by branches bearing leaves also in whorls, appear referable to the same family of *calamites*, or perhaps to one intermediate between *calamites* and *lepidodendron*.



FIG. 11.—*Annularia longifolia*.



FIG. 12.—*Sphenophyllum Schlotheimii*.

One of these, *annularia*, bears linear, lanceolate, thickish, pointed leaflets, sometimes inflated and nearly cylindrical; it resembles *asterophyllites* in its facies; the other, *sphenophyllum*, has cuneate or flabellate leaflets, enlarging upward from the point of attachment.—It is now generally admitted that the



FIG. 13.—1. *Carpolithes*. 2. *Trigonocarpus*. 3. *Cardiocarpus*.

cies predominate in the lower part of the true coal measures, and their remains have especially contributed to the formation of the big vein, B. They gradually disappear in passing up. The *sigillaria* species are more equally distributed from the base to the middle, while the ferns become more predominant in ascending, especially in small species. The *calamites* and ribbon-like *flabellaria* are about in the same proportion through the whole thickness of the carboniferous.—The peculiar distribution of trunks of fern trees in sandstone, which has been remarked upon already, may be taken for evidence in a question often discussed among palæontologists: Do the plant remains found in connection with the coal strata represent the whole flora of the carboniferous period? or was this flora, like that of our present peat bogs,

composed of a limited number of species appropriate by their nature to the growth and composition of the coal, while a different kind of vegetation inhabited dry or high ground? All the specimens of fossil plants found in beds of sandstone, even where no trace of coal is found, represent the same species, or at least the same genera, as those found in connection with coal beds. Hard fruits, resembling nuts and named *trigonocarpum*, *carpolithes*, &c., are locally abundant in sandstone, but sometimes the shale of the coal has them in plenty. Nothing is known as to the relation of these fruits, which have never been found attached to any kind of vegetable remains. They may have been floated by water from a distance, and may therefore, as has been supposed, represent species of plants not found in the true coal basins; but this is very doubtful. The composition of the coal flora, like the formation of the coal over immense surfaces, indicates a great degree of humidity in the atmosphere. The vapors covering the land, extending over the whole emerged surface, developed everywhere the same kind of vegetation, diversified only in its exuberance according to the composition, especially the solidity of the ground. Even the vegetation of the hills, if there were any in proximity to the coal basins, should have been exposed to the same influence. In the southern islands, where fern trees are most common, these plants everywhere follow or ascend the slopes of the mountains in exact concordance with the line of the fogs; therefore a general and permanent degree of humidity should have influenced the same uniform character for the vegetation of the whole land. This seems still better evidenced by the identity of the essential vege-

table types in the carboniferous formation of the whole world. On this subject, however, as on other questions concerning the distribution of the old floras, there is still a great deal of uncertainty, especially caused by insufficiency of materials for observation.

COAL PRODUCTS. The readiness shown by the elements of coal to enter into new combinations where it is exposed to an increase of temperature, and the great variety of the combinations obtained under different degrees of heat, or by the admission or exclusion of air, indicate the close relation of coal to the elements of the vegetable kingdom. It consists of carbon, hydrogen, oxygen, and nitrogen, which make up the great bulk of vegetable matters, and these show the same disposition as in the plants themselves to separate from existing combinations and enter into new. The number of the new products thus formed is almost unlimited. They differ from one another, and from the original substance from which they are generated, as do those obtained in the processes of vegetable fermentation. When heat is applied without access of air, the vapor of water set free acts upon the existing combinations of the elements. These are broken up, and hydrogen and oxygen are evolved under the most favorable circumstances, in their nascent state, to form new compounds with the carbon present, the characters of which vary greatly with the temperature. The process is called dry distillation. By keeping the retorts in which it is conducted at a cherry-red heat, the gases used for illumination are most copiously evolved, the tar itself being decomposed and converted into gaseous matters. (See GAS.) But if the object is to obtain the coal oils, paraffine, benzole, and other hydrocarbons of this

TABLE REPRESENTING THE PRODUCTS DERIVED FROM THE VOLATILE MATTERS OBTAINED IN THE DISTILLATION OF COAL.

Liquids condensed and collected in tar cistern.	Coal tar gives, on redistillation with water or steam	Distilled tar; which affords, on further distillation	Pitch; distilled in ovens, affords...	Pitch coke, Coke oil.
		Crude coal tar naphtha, which consists of	Dead, or pitch oil, consisting of...	Naphthaline, paranaphthaline, and oily hydrocarbons boiling at a high temperature, creosote, aniline, leucoline, paraffine.
				Acids—Rosolic, carbolic, brunolic, creosote. Basis of the pyrole, picoline, aniline, leucoline, methylamine, ethylamine, and other series. Neutral: Allilole, benzole, toluole, cumole, cymole, and other carbohydrogens; naphthaline, hydrate of phenyle (Laurent).
Gases and vapors....	Ammonical liquor, containing	Water, hydrosulphate, carbonate, muriate, acetate, hydrocyanate, sulphite, and gal-		
	Gases and vapors separated in lime purifier	Ammonia, Hydrocyanic acid.		
	Gases and vapors separated sometimes by additional chemical agents.....			
	Gases and vapors conducted to gas-holder.....	Carbonic acid, Sulphuretted hydrogen, Hydrocyanic acid, Ammonia, Olefant gas, Vapors of hydrocarbons, Light carburetted hydrogen, Hydrogen, Carbonic oxide.		
		Very small quantities of.....		
		Nitrogen, Vapor of bisulphuret of carbon, Ammonia.		

nature, care is taken that the retorts are heated very gradually, and do not acquire more than a low red heat. The tarry matters thus escape decomposition, and by repeated distillations afford crude naphtha and its secondary products. The foregoing table represents in the clearest manner the great variety of substances besides coke which are obtained by means of this process, and their immediate sources.—Coal tar was for a long time a troublesome product of the gas works, no useful application of it to any great extent being known. It was employed as a covering to protect iron work exposed to the weather; and the pitch obtained by distilling it was found when mixed with earthy matters to be a good substitute for the natural product asphaltum, used for artificial pavement, water-tight covering for roofs, &c. Finally the tar came to be an object of purchase by tar distillers, who learned to extract from it the crude naphtha and also the light oily fluids. The pitch, too, by repeated distillations was made to yield more oily matters, which are useful for lubricating machinery and other purposes. The crude naphtha is now purified by mixing it with $\frac{1}{10}$ its bulk of concentrated sulphuric acid, adding when cold 5 per cent. of peroxide of manganese and distilling off the upper portion. A rectified naphtha is thus obtained, which readily dissolves caoutchouc, and mixed with wood naphtha produces a powerful solvent of various resinous substances, useful in making varnishes. Still further purified, the liquid benzole is obtained, which has been applied to many useful purposes, especially that of an illuminating agent. The light essential oils, as also the heavier qualities which come over after these, are found to possess antiseptic properties, which render them of value for preserving wood from decay. From the essential oils the tar creosote or carbolic acid is obtained, which possesses extraordinary antiseptic properties, and is used in the preparation of a valuable dyestuff called carbazotic acid. The heavy oil yields a substance called aniline, which gives with bleaching powder and other agents a magnificent blue color, and is employed in dyeing. Naphthaline also, which is a solid white substance obtained in large quantities in the distillation of the tar, yields two coloring matters, one called naphthalic acid, and the other chloronaphthalic acid; the latter of which is nearly identical with the coloring principle of madder, and gives with alkalies a beautiful red color. Instead of naphthaline, by conducting the distillation at a lower temperature, may be obtained the waxy substance called paraffine, which is now used for the manufacture of candles and the paraffine oils. The most important of these products will be found more particularly noticed under their separate heads, and the general subject will receive further attention in treating of gas light.—By oxidizing aniline with bichromate of potash a bronze-colored substance is produced, dissolving in alcohol with a

beautiful purple color. In concentrated sulphuric acid its solution is green. On adding water and precipitating with an alcoholic solution of potash, the coloring matter is precipitated unchanged. It is of intense hue, and considered as good if not better than archil; it is very stable, not being decomposed at a temperature of 482° F. One pound of the solid substance will dye 200 lbs. of cotton a moderately dark lilac, the color standing well the action of light and heat, acids and alkalies. The distillation of coal for obtaining paraffine and the oil accompanying has been conducted in the following manner: The retorts used are like those employed in making gas. A worm passes from them through a refrigerator kept at a temperature of about 55° F. The oil condenses in the worm, and is collected in a receiver. It deposits some paraffine when cooled to a low degree. Some illuminating gas is generated in the process and escapes. Coke also remains in the retort, as in the gas-making process. The oil is purified by heating a cistern of it to about 150° F. Water and insoluble impurities subside on standing, and the oil may be drawn off. It is redistilled to dryness, and a carbonaceous residuum is left in the iron still. From the cold condenser it is run into leaden vessels, and $\frac{1}{10}$ its bulk of oil of vitriol is added and the mixture is well stirred for an hour. In 12 hours the sulphuric acid has settled, together with the impurities it has taken up. The oil is then drawn off into an iron vessel, and 4 gallons of a solution of caustic soda, of sp. gr. 1.3, are added to every 100 gallons of oil. This is well stirred for an hour, to take up all the remaining acid, and it is then left for 6 or 8 hours for the soda and impurities to subside. The oil is again drawn off and distilled. Paraffine oil thus obtained contains a more volatile oil, that may be mostly separated from it. Half its bulk of water is added to it, and the mixture is distilled as before, the boiling being continued for 12 hours by renewing the loss in the still with more water. The steam carries the more volatile fluid over with it. They condense in the worm, and separate by standing in the receivers. This fluid is suitable for burning in lamps and for other purposes. The oil left in the still is to be drawn away from the water left with it, purified by distilling from $\frac{1}{10}$ its bulk of sulphuric acid, and then from chalk added as the caustic soda was used. The oil is kept for a week in a warm place, and being then drawn off from the sediment is fit for lubricating or illuminating purposes. Cooled to 30° or 40° F., the paraffine crystallizes, and may be collected by pressing out the oil through cloths.—An improvement made upon this process consists in introducing highly heated steam into the retorts with the bituminous matters. It rapidly unites with and carries off the volatile matters arising from the coal, checking their conversion into gas, and greatly increasing the amount of oily or condensable product. The condenser is kept at a temperature of

about 55° F. The products obtained are next distilled, and very hot steam is introduced again, if much paraffine rather than oil is desired. At different stages of the process different products are obtained, which are separately collected. These are, first a thin, impure eupione oil, to the extent of about one eighth of the fluid; then a thicker and heavier oil, containing paraffine, amounting to two fifths or one half of the fluid; and lastly, paraffine mixed with heavy oil. The crude eupione oil is purified by adding 5 to 10 per cent. of sulphuric acid, diluted with an equal bulk of water, and half as much by weight of bichromate of potash as of the acid. Heat is then applied, and the mixture is well stirred while heating. When it has reached the temperature of 212° F. it is allowed to cool and settle. The eupione, being drawn off, is next treated with a warm solution of caustic soda, and left to settle. It is at last taken off from the heavier fluid and distilled. The heavier oil is treated very much in the same way, the black oxide of manganese instead of the potash salt being sometimes used with the sulphuric acid. The first comings over in the distillation are added to the eupione oil; but the greater part is the so-called "lubricating oil," the most important product of the process. The last portions are thick like butter, and yield mostly paraffine when treated with that already obtained with the heavy oil. This, after being allowed to crystallize in a cool place, is put in a bag for the oil to drain away. It is then pressed, melted, and when cold pressed again, the oil being added to that already obtained. It is melted again, and at the temperature of about 400° F. from 5 to 10 per cent. its weight of strong sulphuric acid is stirred in. On boiling, the remaining oil is completely charred, and on cooling settles as a black powder. Another boiling after separating this powder completes the purifying process, though the paraffine is now after several new methods bleached to a beautiful degree of whiteness. Its properties will be described in the article PARAFFINE.—Coal oils have been manufactured at several localities in the United States. Important works at Cloverport, in Breckenridge co., Ky., on the Ohio river, were destroyed by fire in 1858. They produced large quantities of an oil of excellent quality, which was on trial with a view to its being introduced into our lighthouses; but all the coal oil distilleries have been closed by the discovery and wonderful production of petroleum, which amounted to 539,472 barrels in the month of June, 1872, from the Pennsylvania oil regions alone. Not only the cannel coal and other fat coals produce these oils, but the bituminous shales, until of late years regarded as worthless, have been applied at Dartmoor, in the west of England, at Autun, France, and at Bühl in Prussia, to the same purpose.

COAN, Titus, an American missionary, born in Killingworth, Conn., Feb. 1, 1801. He studied theology at Auburn seminary, was ordained

as a Congregational minister in Park street church, Boston, in 1833, and the same year went upon an exploring mission to Patagonia, landing near the strait of Magellan. Finding the country unfavorable for the establishment of a mission, he returned to New London, Conn., and thence sailed for the Hawaiian islands, where he arrived in June, 1835, and was stationed at Hilo, on the island of Hawaii, where he has since resided. Apart from his successful missionary labors, he has made valuable contributions to the knowledge of volcanic eruptions, published in the "American Journal of Science" and in the "Missionary Herald."

COANZA, a river of S. W. Africa, flowing into the Atlantic ocean on the coast of Lower Guinea, south of St. Paul de Loanda, in lat. 9° 20' S. and lon. 13° 12' E. Its source is supposed to lie eastward of Bihe, between lat. 12° and 13° S. and lon. 17° and 18° E. Its general course thence to the sea is in a north-westerly direction. The entire length of the river is estimated at not less than 500 m. The entrance to the Coanza is obstructed by a bar at its mouth, though the river is navigable for light-draught steamers, if they could gain access to its waters. At the confluence of the Lucalla, over 100 m. inland, it is about 150 yards wide. Canoe navigation extends to Cambambe, 150 m. from the sea, where further ascent is prevented by a large waterfall. There is another cascade above this, at the junction of the Lombe with the Coanza, in lat. 9° 41' S. and about lon. 16° E., where Livingstone says hippopotami and elephants are frequently swept over and killed. Here the current is rapid and flows over a bed of sandstone rock, with pebbles. A fresh-water fish called *cacasu* is caught in the river, and is highly relished by the natives, who eagerly purchase it from the fishermen. Shell fish also occur. In the lower part of its course the Coanza forms the boundary between Angola and the other Portuguese dominions on the west coast of Africa. The rich, level, and productive Portuguese settlements of Cambambe, Massangano, Muxima, and Pungo-Andongo border upon its banks. Magnetic iron ore is still worked near Massangano, where are the ruins of a massive foundery erected by the marquis of Pombal in 1758. A canal to connect the Coanza with St. Paul de Loanda was commenced by the colonial government early in the present century, but remains unfinished.

COARI, or **Coary**, a river of Brazil, having its whole course in the province of Alto Amazonas, runs N. E., forms the boundary between the districts of Teffe and Coari, traverses a considerable lake, and divides near Alvellos into two arms, which join the Amazon. Length of the river, 285 m.

COAST RANGE, or **Coast Mountains**, a mountain range of California, nearly parallel with the Pacific coast, and extending from near the boundary of Oregon into the peninsula of Lower California. Its width is from 30 to 40 m.

and it is divided by the bay of San Francisco. S. of lat. $34^{\circ} 20'$ N. a plain from 25 to 40 m. wide lies between the mountains and the sea, the spurs being short and running at right angles with the main ridge; N. of that, the spurs form the greater part of the coast line. The principal of these S. of the bay of San Francisco are the Santa Susanna, Santa Inez, Santa Barbara, and Santa Lucia ridges. E. of the bay is the Contra Costa ridge, which is crossed by the Gabilan ridge. N. of the Gabilan are the Sonoma and Carneros ridges, beyond which the spurs are so numerous and closely connected that they are scarcely distinguished by name. These spurs are separated by fertile valleys, some of which are 60 m. long by 10 m. broad, watered by streams, and possessing a genial and equable climate. The most noted are the Los Angeles, Salinas, Santa Clara, Sonoma, and Napa valleys. The principal peaks of the main ridge are Mt. Ripley, 7,500 ft., lat. $39^{\circ} 8'$; Mt. St. Helena, 3,700 ft., lat. $38^{\circ} 40'$; Monte Diablo, 3,881 ft., lat. $37^{\circ} 50'$; Mt. San Bernardino, 11,600 ft., lat. $34^{\circ} 20'$; and Mt. San Geronio, 7,000 ft., lat. $33^{\circ} 48'$. N. of all these are Mts. Linn and St. John. The principal passes are S. of the outlet of the Sacramento basin. The northernmost, Livermore's pass, lat. $37^{\circ} 42'$, is 686 ft. high; the others are mostly higher, the two southernmost, San Geronio and Warner's, lat. $33^{\circ} 10'$, being respectively 2,808 and 3,780 ft. high. Nearly all the spurs, valleys, and streams of the range run to the west. The Coast mountains are steep and rocky. N. of lat. 38° they are covered with timber and brush; S. of that the ridges nearest the ocean have some timber, and those further inland are nearly bare. The main ridge, near the head of the Sacramento valley, is called Trinity ridge; near Monte Diablo is the Diablo or Bolbones ridge; S. of lat. 34° is the San Bernardino ridge, and in one place the Cuyamaca mountain.—A range of mountains in the N. W. part of Oregon, running parallel with the sea, is also designated the Coast range. The Calapooya mountains connect it on the south with the Cascade range.

COAST SURVEY, United States. The coast survey of the United States is a national undertaking of high character and importance. Having an extended and dangerous seacoast, with a large foreign commerce, in the pursuit of which many thousand vessels annually enter and leave our ports, with an immense coastwise trade which employs many vessels and thousands of seamen, it is plainly our duty as a nation to provide every means which science and practical skill can afford for pointing out the dangers to which this commerce is exposed, and to furnish every facility for its successful prosecution. To accomplish these objects the coast survey was founded. It is designed to furnish accurate maps of the whole coast; to point out the positions for lighthouses, beacons, and other signals; to determine the character

and course of the currents of the ocean along our shores; to develop and determine the laws of the tides; to ascertain the prevailing courses of the winds and the general laws of atmospheric influence, the changes which take place at the entrances of our harbors, the character of the bottom of the sea within the limits of soundings, and all other questions which contribute to a thorough knowledge of our coast and its adjacent waters. It has also the further object of distributing this knowledge throughout the world, so that all nations may partake of its advantages. For the accomplishment of these objects a wide range of application of the practical sciences is required. Astronomy and geodesy furnish the means of projecting maps. The highest forms of mathematical science are required in the investigation of the laws of the tides and the figure of the earth. Geology explains the changes which are constantly taking place in all our harbors and rivers, and in the general form of the coast. Natural history accounts for the formation of those coral reefs in the southern waters, so long the terror of navigators, predicts their growth and extension, and investigates the forms of animal life at the bottom of the sea, thus affording new and unexpected aids to navigation. Physical science furnishes the electric telegraph, by which longitudes are determined, and the electrotype and photograph, by means of which engraved plates and charts are indefinitely multiplied. The mechanic arts supply the most delicate instruments; and the industrial arts of drawing, engraving, and printing are all required in their greatest perfection. For the expanded conception of this great institution as it now exists; for the administrative skill which has perfected its organization; for the solution of many interesting questions of science which it has involved, especially those of the tides, the Gulf stream, and the magnetic force; for the genius which has brought to the highest perfection the scientific methods employed; for the untiring labor which, within a comparatively short period, has produced greater results than any other institution of the kind, the world is greatly indebted to Prof. A. D. Bache, the late superintendent. Since his death the work of the survey has been greatly extended, and its usefulness increased, by the present superintendent, Prof. Benjamin Peirce. The most important work set in operation since his accession to the position of superintendent is the great national triangulation—a geodetic survey which is intended to embrace the shores of the Atlantic and Pacific within its limits, and to form by means of triangulation a grand chain across the continent, which will serve in a most satisfactory manner to verify the independently determined longitudes of the Pacific coast. This great work, together with the other improvements which have been made under the rule of the present superintendent, will be referred to in another place.—The first

attempt to organize a national coast survey was made in 1807. In that year President Jefferson in his message to congress recommended the establishment of a national coast survey, "for the purpose of making complete charts of our coast, with the adjacent shoals and soundings." It is believed that to Prof. Patterson of Philadelphia is due the honor of having first suggested to the president the idea of a geodetic survey of the coast. At that time the only charts of our extended and dangerous seacoast were those of the "Atlantic Neptune" of Col. Des Barres, Romaine, and Gauldel, and compilations from those works by English and American publishers. Congress passed an act authorizing such a survey, and appropriated \$50,000. Mr. Gallatin addressed circulars to the principal scientific men of our country, requesting their opinions with regard to the best methods of conducting the proposed work. The plan proposed by Mr. F. R. Hassler was adopted. The plan was, essentially, to establish the positions of certain prominent points of the coast by astronomical observations, and to connect these points by trigonometrical lines, so as to form a basis upon which the nautical survey could be made. Mr. Hassler, a native of Switzerland, had been engaged in the trigonometrical survey of that country, and was eminently fitted by his scientific attainments for the execution of the task to which he was now called. On account of the threatening nature of our relations with Great Britain, nothing was done toward the actual prosecution of the survey till 1811, when Mr. Hassler was sent to Europe for the purpose of procuring the necessary instruments and standards of measure for commencing the work; and the war which followed caused him to be detained abroad as an alien enemy till 1815. On his return he was formally appointed superintendent of the coast survey, and commenced his labors in the field in 1817, in the vicinity of New York. His first work was the measurement of a base line in the rear of the Palisades, on the Hudson, as a foundation for the triangulation of New York harbor and the adjacent coast. Before he could publish the results of his first year's labor, however, the coast survey was effectively discontinued; and another interval of ten years elapsed, during which some additions were made to a knowledge of our Atlantic coast through detached surveys of a few of the more important harbors, made by the navy and the topographical engineers of the army, and those of the Messrs. Blunt. In 1828 Samuel L. Southard, secretary of the navy, urged upon congress the importance of reestablishing the coast survey upon its original plan; and in 1832 Mr. Hassler was restored to his position, and enabled to resume the work. A quarter of a century had now elapsed since Mr. Hassler first urged his scheme of a thorough trigonometrical survey. He continued to superintend its operations until his death in 1843,

when the survey had been extended from New York eastward to Point Judith, and southward to Cape Henlopen. He was succeeded by Prof. A. D. Bache.—On assuming charge of the coast survey, Prof. Bache saw the necessity of extending the plan so as to embrace all the objects of which we have spoken. He urged upon congress the importance of carrying on all the principal operations at different points of the coast at the same time; the different sections to be conducted on the same general principles, and to be ultimately connected, so as to form a complete and continuous work. He saw that the great characteristic feature of the Atlantic, the Gulf stream, must be investigated; the laws of the tides developed, so that navigators might be furnished with correct information regarding their ebb and flow in the harbors and rivers; the infinite maze of currents produced by the tides, the Gulf stream, and the winds, combined, threaded out, and mapped; the magnetic force of the earth studied, and its laws along our coast determined; the changes of the weather at different seasons of the year, and the laws of storms, investigated. All these conceptions were far beyond any that had been entertained; and Prof. Bache at once organized those systematic observations which extended through the whole period of his administration, and are continued at the present day. The most important results to navigation and to science have been and are being developed by these observations. Under this plan of reorganization, as it may be called, the survey continued to advance with great success until the breaking out of the late civil war. By the secession of the southern states their immense seaboard became hostile coast, and the peaceful operations of the coast survey of necessity ceased. Several vessels employed in the work were captured, and some of the officers narrowly escaped. Debarred from the direct prosecution of the survey of the southern coast, Prof. Bache sought to turn at once to practical account the knowledge of the harbors and their adjacent coasts along the southern seaboard which his officers had acquired during the progress of their labors. Topographical engineers being much needed in the army, he supplied skilled topographers from his own corps. Pilots being necessary for the squadrons which operated on the enemy's coast, he furnished officers of the survey whose local knowledge enabled them safely to pilot the largest vessels of war into harbors from which buoys, lights, and all other aids to navigation had been purposely removed, and whose hydrographic knowledge enabled them in a short time to replace the old marks by others better adapted to the purposes of navigation. During the war there was not an army in the field without one or more coast survey officers attached to the staff of the general commanding, as topographers, and rendering most efficient service; and no

important naval demonstration was made upon the coast without the presence of some officer from the same service on the staff of the admiral commanding the fleet. The services thus rendered to the country during the war by the officers of the coast survey were of the utmost importance, and were thoroughly appreciated by the government. Added to this, the accurate charts of the coast and harbors which had been already made and published were of the greatest assistance to our vessels in their cruises up and down the coast. Worn down at length with the labors of a busy life, Prof. Bache died in 1867, and Prof. Benjamin Peirce was installed as superintendent Feb. 26, 1867. Since his accession Prof. Peirce has continued with vigor the system inaugurated by his predecessor, and has greatly extended and enlarged the sphere of usefulness of the coast survey. The great system of a national triangulation, which extends the geodetic work, heretofore confined to the sea-coast, across the whole continent, owes its existence, and in a great measure its conception, to the present superintendent. This work, which is now (1873) in successful operation, contemplates the establishment of a system of triangles connecting those already determined on the Atlantic with those on the Pacific coast. Thus in every state and territory geodetic points will be established and accurately determined; and thus will be formed a base for a thorough topographical survey of the several states, which will equal if not surpass in beauty and accuracy the famous ordnance survey of Great Britain, while in point of magnitude and extent it will surpass anything in the world. Prof. Peirce, on assuming charge of the survey, encountered some difficulties in the way of a vigorous prosecution of the work. As before mentioned, several of the vessels belonging to the survey had been captured during the war; others were very old, and many were completely worn out and unfit for service; and the small number remaining were totally inadequate for such activity in the field as had always heretofore existed. But these difficulties are rapidly being overcome. Prof. Peirce has urged upon congress the passage of special appropriations for the building of new vessels, and several fine ones have already been built and are at work upon their stations. The survey of the Pacific coast, which had been somewhat disorganized owing to the war, he established upon a new and firm basis, with an experienced officer at its head; and the work upon that coast has proceeded with unexampled rapidity. Much valuable scientific information has been obtained by the observations of the solar eclipses made by the superintendent and his assistants, under special acts of congress, in 1869 and 1870. Much has been done, and very valuable information collected, through the observations for deep-sea temperatures; and the many thousand specimens collected from the bottom of the sea at great

depths have added much to our knowledge of the character of the great sea floor. The investigations which have been made of the tides are of great importance; they will be referred to in their proper place. A directory or coast pilot of the Pacific coast has been published for the use of mariners, and one is in preparation for the Atlantic and gulf coasts. Every year increases the general usefulness of the survey and the vigor and success of its prosecution.—These general facts with regard to the history and progress of the United States coast survey being stated, we come to the scientific and practical operations involved in its execution. An explanation of these operations will embrace a variety of topics, and only a brief notice of each can be given. The first object of a work of this kind is an accurate determination of the shore line. This is done entirely by operations upon land. The object of a map or chart is, of course, to give a miniature representation of a portion of the earth's surface upon paper, in such a manner that the different parts of the drawing shall have the same relative positions and dimensions as are found in nature. To determine these dimensions by linear measurement, for the purpose of reducing them to the scale of the drawing, would be practically impossible; and hence the use of geodetic or trigonometrical surveying.—*Geodesy—General Remarks.* To illustrate this mode of measuring distances and establishing the relative positions of points on the earth's surface, let us suppose ourselves to be on a level plain, surrounded in the distance by high mountains, and that we wish to determine the distances from our position to the tops of those mountains, and of the different mountain peaks from each other. A line is measured on the plain, of such a length that if two lines be drawn from its extremities to one of the mountain tops, they will intersect at a considerable angle, and form with the measured line a triangle of proper dimensions. Then, knowing the length of one side of this triangle, we may compute the length of the other two sides by a simple theorem of trigonometry, without any further labor than measuring the angles of the triangle. Taking now either of the computed sides as a new base, we may establish a second triangle upon this, and thus fix the position of another point. A third point may be established in the same manner, gradually expanding the system until the whole region we wish to embrace in the map is covered with a network of triangles; the length of the lines having been computed by measuring the first only, and then measuring the angles of the triangles. For the purpose of a map or chart, there are still two important elements wanting. We have yet no means of knowing the direction of any one of these lines with reference to the meridian, nor the place which the points occupy on the surface of the earth. The survey thus far will give no means of knowing whether

any two points are situated in a north and south or an east and west line; nor whether its site is near the equator or near the poles, or to the east or west of the first meridian. These wants are supplied by astronomical observations, by which the latitude and longitude of some point, and the directions of the lines with reference to the meridian, are determined. The system of triangles which we have described may be extended over large areas, or along a coast for several hundred miles, depending upon one measured base line. By determining the positions of the extremities of the base line and its direction by astronomical observations, the positions of all the other points of the system and the direction of the lines may be computed after the angles have been accurately measured. Accuracy requires that the computed positions should be frequently verified by actual observation, and the computed lengths of the lines occasionally verified also by the introduction of a measured base of verification. The geodetic work thus involves the measurement of the base line, the measurement of the angles of the triangles, and astronomical determination of the latitude and longitude of the different points, and of the directions of the lines with reference to the meridian. This last is called the measurement of an azimuth.—Reconnaissance is the first operation in order. An experienced officer first travels over the country to be surveyed, and makes a preliminary examination for the purpose of selecting the trigonometrical points which will best fulfil the required conditions. Elevated positions are generally chosen, from which extended views can be taken. A site for a base line is selected on some level plain for convenience of measurement, and from which the triangulation can easily be expanded. In the selection of geodetic points great judgment is required; as upon this depends in a great measure the economy, accuracy, and success of the work.—*Base Line.* For the measurement of the base line a standard must be adopted. The English use the yard, which is also the legal standard of length in the United States. But in the coast survey measurements the French *mètre* is used, which is more convenient on account of bearing a certain relation to the magnitude of the earth, being equal to the ten millionth part of the earth's quadrant. The metre bar used as standard in the coast survey is one of those originally made by the French committee of weights and measures. For the actual measurement of base lines rods of wood, metal, or glass have been used; but the changes of length caused by changes of temperature in a simple bar of any material have rendered it desirable to construct a special apparatus for the purpose, upon a compensating principle, which will retain the same length under all temperatures. The base apparatus of the coast survey, devised by the late Prof. Bache, is considered the best known. It has not only the same length at all stationary tem-

peratures, but preserves it also while the temperature is changing. Bars of different metal, having the same dimensions and exposed to the same source of heat, will not heat equally in equal times. The thickness and surface of the bars are therefore so proportioned to their relative power of conducting and absorbing heat, that they will equally follow changes of temperature. The principle of the level of contact has been applied to the apparatus; and the exactness of its operations is so great that lines of seven or eight miles in length may be measured with a probable error of only a fraction of an inch. Two sets of compensating bars are used, each 6 metres (nearly 20 feet) in length. Mounted on trestles, provided with every mechanical movement for adjusting the bars in height and direction, this apparatus is handled with such facility that on favorable ground a mile may be measured in an ordinary working day.—*Triangulation.* For the measurement of the angles theodolites of the most accurate construction are used. In the primary work on the Atlantic coast a large theodolite with a circle 30 inches in diameter is employed. This is carried to the summit of the hill or mountain where the angles are to be measured, and established carefully over the station point, where it is left standing until the measurements at that point are completed. The party having this work in charge live in tents, or in some convenient dwelling near at hand, so as to take advantage of the occurrence of favorable weather for the observation of distant signals. The instrument is furnished with a powerful telescope, which will give a distinct view of such signals. The signals are usually straight poles supported by a tripod, erected at the various points; but on the long lines an instrument for giving signals is used, called a heliotrope. This is simply a round mirror about the size of a silver dollar, so mounted on a telescope that an assistant at any distant station is able to reflect the rays of the sun in the direction of the observer. The telescope is used to direct the instrument correctly toward the central position at which the observer is stationed. It is not unusual to see the heliotrope on the summits of mountains 80 or 90 miles distant, when the outlines of the mountains are not visible. The measurement of the angles at a primary station occupies three or four weeks. It is found to be impossible to work during the middle of the day, on account of the agitation of the atmosphere caused by the heat of the sun; and hence only about two hours in the morning and evening can generally be devoted to this work. Each angle is determined by about 30 measurements; and as at each station there are from 10 to 20 angles to be measured, only two or three primary stations can be occupied in one season. Depending upon the primary triangulation, and controlled by it, a network of secondary and tertiary triangles is formed along the seacoast, extending up the bays and rivers. The angles are mea-

sured with theodolites more portable than the one above mentioned, the circles varying from 6 to 12 inches in diameter according to the distances to be observed. These triangulations determine the relative positions of prominent points, at distances averaging from two to five miles, and thus form a skeleton map, in which the details of configuration of shore line and surface remain to be supplied by the topographer. If the figure of the earth were precisely known, it would suffice, in order to fix the situation of the whole network of triangles on the surface of the earth, to determine the latitude and longitude of some one point, and the direction with reference to the true meridian of one of its lines, *i. e.*, its azimuth. But, owing to the irregularities of the earth's figure, it is found necessary to repeat the determinations very frequently, by which means the work is checked and any accumulation of error avoided.—*Latitude.* All the known methods of determining latitude have been used in the coast survey, for the purpose of ascertaining their relative merits. Large vertical circles or repeating theodolites were first used for observing double altitudes; but these made way for more perfect and larger instruments, the zenith sector, the prime vertical transit, and the zenith telescope or equal altitude instrument. The first mentioned of these instruments, constructed according to the plan of Prof. Airy, gives very satisfactory results; but it is rather heavy for transportation, and the observations are laborious. The method of determining latitudes by observations of transits of stars over the prime vertical, first used by Bessel, is admirable in theory, but in practice a great loss of time and labor is often caused by clouds. The zenith telescope, or equal altitude instrument, was first applied to the determination of latitudes by Capt. A. Talcott, a former officer of the United States army; it has been remodelled and specially adapted to the purpose in the coast survey, where it has become a favorite instrument on account of the great number and accuracy of the results that can be obtained in a given time, and the facility with which it is used. A large number of observations (from 150 to 200) are made at each station, and the mean is taken as the result, the uncertainty of which is thus reduced to a small fraction of a second. Mr. George Davidson has devised an instrument, now in successful use both on the Atlantic and Pacific coasts, which combines in a simple and beautiful manner the principles of both the zenith telescope and the transit instrument, so that observations for longitude and latitude may be made by the one instrument at the same station. This instrument gives general satisfaction for its compactness, delicacy, and accuracy, and will doubtless soon be in general use.—*Longitude.* For the purpose of determining the longitude of all points in the coast survey, with reference to Greenwich and other European observatories, it is only necessary to ascertain that of one point,

the difference of which from all others is known by the triangulation, and by differences of longitude obtained by means of the electric telegraph. The observatory of Cambridge, Mass., has been used as such a point of reference. Its longitude from Greenwich has been determined by astronomical observations of eclipses and occultations of stars by the moon, and of moon culminations, made not only there, but at other observatories in the United States, the longitude of which from Cambridge has been determined by electric telegraph. Besides the astronomical methods, a chronometric method has also been used. A large number of chronometers have been transported repeatedly and in different years between Cambridge and Liverpool, for the purpose of comparing the time of the observatories at those places. The results of these expeditions, in which special regard was had to the effect of temperature on the rates of the chronometers, show a pretty close agreement in different years, but differ from those by astronomical observations by about two seconds of time. The telegraphic determinations of longitude have been extended from Washington northward to Philadelphia, New York, Albany, Cambridge, Bangor, Calais, and Halifax; southward to Petersburg, Wilmington, Charleston, Savannah, Pensacola, Mobile, and New Orleans; and westward to Cincinnati, St. Louis, Salt Lake City, and San Francisco. Most successful results have also been obtained from the telegraphic campaigns between Heart's Content and Valentia over the British Atlantic cable; and equally good determinations have been secured between Havre, France, and Duxbury, Mass., over the French submarine cable. The results have been entirely satisfactory, and have given the difference of longitude between Greenwich and Cambridge within the smallest limits of error. Through these methods the longitude of San Francisco on the Pacific coast is as accurately known as that of Cambridge or Greenwich. In the telegraphic method, which is by far the most accurate for determining difference of longitude, the coast survey has taken the lead, and has brought it to a state of perfection which subsequent operations of a similar nature executed in Europe have not yet reached. The idea of comparing the local time of different places by means of the electric telegraph is sufficiently obvious, and dates from the conception of the telegraph itself. But the refined methods by which the intervention of human senses and operations, and the consequent liabilities to error, are in the greatest possible degree avoided, and by which the time of transmission is measured and eliminated from the longitude, have been the result of careful study and long experience. The first experiments on the velocity of galvanic signals were made in 1848. They have since been frequently repeated; and the velocity is found to vary from 10,000 to 20,000 miles per second, according to the size and kind of wire em-

ployed. The manner in which this experiment is made is essentially as follows: An astronomical clock is so connected with the telegraph wires as to graduate by its beat slips of paper delivered with uniform velocity into spaces representing seconds of time, each about an inch in length, both at the place where the clock is and at some distant station. If now, at the latter station, arbitrary signals are made between those given by the clock, and transmitted to the clock station, the corresponding marks on the register of that place will appear later, or more distant from the preceding clock marks than on the register where they are made. The difference measures the whole time of transmission from the former to the latter station and back again. On the Pacific coast, besides the telegraphic determinations already spoken of, longitudes have been determined by the astronomical methods and also by chronometric expeditions. In 1860 an expedition was undertaken from Point Hudson, Admiralty inlet, to Gray's harbor, Washington territory. In 1861 another was made between San Francisco and Coos bay in Oregon. In 1867 the first Alaska expedition was undertaken from San Francisco, during which the ports of Victoria, Port Simpson, Sitka, St. Paul's harbor, Captain's harbor, Port Lincoln, and Stony island were visited. In 1869 the second Alaska expedition took place, and Astor point in Columbia river, Esquimalt on Vancouver's island, Victoria, Fort Wrangel, Kok-klux, and Sitka were visited. In 1869 an expedition was made from San Francisco to Eureka in Humboldt bay, California; and in 1870 another between San Francisco and Punta Arenas. —*Azimuth.* The direction of the meridian is determined by observations on the pole star, or other close circumpolar stars, at the time of their passing the meridian, or of their greatest eastern or western elongation. The angle between the vertical plane passing through the star and that passing through one of the triangle sides is measured with a theodolite. The angle which the former plane makes with the meridian can be computed from the time of observation and the star's place; and thus the azimuth, or true bearing of the triangle side, becomes known, as well as the bearing of all other sides connected with it by triangulation. —*Topography.* This is a representation on paper of the natural features of the country. The outlines of the shore, the irregularities of the surface, the forms and dimensions of hills, forests, streams, rocks, meadows, towns, and villages, are all represented by certain conventional modes of drawing, well understood by those who make use of the maps. The drawing presents to us the surface of the earth as it would appear to an observer from above it. The surveyor uses a table or board on which is fitted a sheet of drawing paper. On the latter several points of the triangulation are already plotted. For the mapping and delineation of intermediate points use is made of the alidade

in connection with the plane table, as the table mentioned above is called. The plane table is a well seasoned drawing board, about 30 inches in length and 24 in width; it is usually composed of several pieces of wood grooved together in such a manner as to prevent warping, and is supported upon three brass arms which are connected with and supported by a tripod arranged with levelling screws. The sheet upon which the country is to be mapped is fastened to the table by means of brass clamps. The alidade consists of a brass rule about 22 inches long, having a circular level on its upper face. Near the middle of the rule is a perpendicular cylindrical column of brass called the standard; on the top of this standard is a square brass plate, which supports four columns; these in their turn uphold two cross pieces, upon which rests the axis of a telescope. To one end of the axis is attached a vertical arc, which is used in the measurement of vertical angles for heights. The telescope itself has the usual cross bars and means of focal adjustment. In practice the operation of the plane table is as follows: The surveyor places his table upon the ground, properly adjusts it by the levelling screws, and determines its position on the sheet by drawing lines on the paper, in the directions of at least three of the trigonometrical points. The intersection of these lines on the paper will give the position which his table ought to occupy on the map. Having fixed this point, he directs the telescope of his alidade to any prominent points in sight, and draws lines in their direction by means of the ruler. Then going to a second point, and fixing his position in the same way, he sights to the same objects as before from his new position. The lines thus drawn on the sheet will fix by their intersection the places of all these points on the map. It is in fact a practical continuation of the triangulation on a minute scale. Accidental details of ground and slight irregularities of shore line may be drawn by the eye. The topographical maps are generally surveyed on a scale of $\frac{1}{100,000}$ of the natural dimensions. In localities where a great amount of detail is to be represented, such as large cities and their vicinity, a scale of $\frac{1}{25,000}$ is employed; and in some special surveys so large a scale as $\frac{1}{5,000}$ has been used. On the other hand, on flat and thinly settled ranges of the coast, a scale of $\frac{1}{200,000}$ is employed. The extent of ground represented upon a single topographical sheet depends upon the scale. On a scale of $\frac{1}{100,000}$, or about six inches to the mile, a square foot of the drawing represents about four square miles of the surface of the earth. The metre chain, which was frequently used in topographical work to determine distances where the usual means of intersection could not be applied (as in roads, on beaches, &c.), is now to a great extent superseded by a simple but very useful instrument called a telemeter. This, as used in the coast survey, is simply a scale of equal parts, painted upon a wooden rod

10 feet long, 5 inches wide, and $1\frac{1}{4}$ inch thick, so graduated that the number of divisions upon it, as seen between the upper and lower horizontal wires of the telescope of the alidade, is equal to the number of units in the distance between the observer's eye and the rod held at right angles to the line of sight. In all cases it should be graduated experimentally for the particular instrument and eye of the observer who has it in use. Thus the topographer, without moving from his position, can determine with accuracy the distances from him of any number of points within 300 metres. The telemeter has given very satisfactory results.—

Hydrography. The survey of the land having been completed by the method detailed, the hydrographer is ready to plot his soundings and observations in their proper places on the map. Under the head of hydrography are placed all those operations which are performed at sea for the determinations of the positions of the rocks and shoals, the depths of the water, and the investigations of tides, currents, &c. The principal labor is that of sounding. With the outlines of the shores furnished by the topographer, the hydrographer has only to measure certain angles upon the shore signals at regular intervals in the progress of a line of soundings, and the position of his boat or vessel on the line is thus determined, and of necessity the soundings taken on the line. These determinations are so accurate that the navigator may run his course by the soundings given on his charts. The angles are measured by a sextant, and the positions plotted upon the chart. In practice, the position of the boat is determined at intervals which vary according to the depth of water, the speed of the boat, the force of the tidal current, the frequency with which the soundings are taken, and the character of the bottom. Thus in strong tideway, or in a rocky and uneven bottom, angles would be taken at very short intervals; while in smooth even bottom as much as five minutes is often allowed to elapse between any two angles. The intermediate soundings, being taken at equal intervals of time, are laid down at equal intervals between the positions determined by angles. The number of soundings is generally so great that the features of the bottom of the sea, within a wide belt adjacent to the coast, are almost as well determined as those of the land; and with the further assistance of the specimens of the bottom which are brought up by the sounding-lead, the mariner may during foggy weather determine his position with considerable accuracy by soundings alone.—*Physical Hydrography.* The hydrographer determines the soundings along the coast and in the various harbors, the position and extent of the various shoals and rocks and the depth of water upon them, the rise and fall of the tides, the direction and velocity of the currents, and the various changes that take place in the channels and bars of our coast. Physical hydrography has for its prov-

ince the investigation of the causes of these changes, with a view to determining the laws upon which they depend, and if possible to provide remedies. It studies in particular the whole subject of tidal currents, and their effect upon the harbor channels; the effect upon these channels of the increase of wharf lines in cities; the improvement of harbors by breakwaters and sea walls; the action of the sea upon beaches; and all of the many questions which arise in the discussion of the laws of change in harbors and on the coast. The coast survey has done much in the way of investigations in this science, especially in the harbors of Boston and Portland. In the latter city extensive operations are in progress for improving the Back bay, the result of the recommendations of the present superintendent, based upon surveys and reports made by his officers. In Boston a most extensive system of improvements has been going on for years, which will in a short time greatly increase the value of that already excellent harbor. At Edgartown and Vineyard Haven in Massachusetts, at the harbor of Nantucket, and at Chatham, examinations have been made and improvements projected, which will ultimately redound greatly to the advantage of those harbors. Constant observations are made in New York harbor and its vicinity, and such improvements suggested as will arrest any unfavorable changes in the channel. This is a work of great labor and importance, and is increasing in success and usefulness year by year.—*Tides.* One of the most difficult questions presented to men of science is the solution of the problem of the tides. The importance to the mariner of knowing the exact rise and fall, and the times of high and low water, may be appreciated when we consider that the entrances to many rivers and harbors on the Atlantic coast are obstructed by sand bars, which can only be crossed by vessels of more than ordinary draught at the highest stage of the water. It becomes therefore an object of immense importance to commerce and navigation to determine the laws which govern this rising and falling of the sea, and to furnish such rules as will enable the mariner to predict with certainty all the phenomena connected with this subject. There is indeed no subject which is so constantly in a sailor's thoughts, on approaching the entrance to harbors and rivers, as the tides. In many cases the safety of his ship and his life depend upon his precise knowledge of the time of high water, or the ebb and flow of the current. The theoretical solution of this question was one of the first results of Newton's theory of gravitation. The most casual observer may notice the close dependence of the tidal phenomena upon the moon's motion. The wave of high water follows the moon in her motion around the earth by a determinate interval of time; and the height of the tide depends also upon the position of the sun and moon. As the elevation of

the water is produced by the joint attraction of the sun and moon, the height will be greatest, of course, when those bodies are in conjunction, that is, at new and full moon, giving rise to what mariners call spring tides. When the moon is 90° distant from the sun, or in quadratures, the joint effect will be least, and the neap tides will be produced. The discussion of this problem has engaged the attention of the most profound mathematicians since the days of Newton, particularly Laplace; and yet the mathematical theories, although correct, have failed until recently in giving results which have been confirmed by observations. The cause of the discrepancies has existed, not in the mathematical deductions, but in a want of knowledge of the physical geography of the globe, and of the depth and form of the bottom of the sea; and, although very important advances in our knowledge of this subject have been recently made by scientific men both at home and abroad, yet it may be said that it is still one of the most perplexing questions in physical science. Prof. Bache, on assuming charge of the coast survey, organized a system of tidal observations, embracing the entire coast. It is the most extended system of observations that has yet been attempted, and has already produced highly useful results. Of these the most important to mariners is the publication annually by the coast survey of a series of tide tables, by which they are enabled to predict with great accuracy the time and approximate height of the tides at any of our more important harbors for every day in the year. This useful publication has now been in existence for several years, and its advantages to the sailor are almost incalculable. Tidal observers in the coast survey service are required to note hourly the height of the water at each tidal station, by means of a staff placed in the water, by which also the precise times and height of high and low water can be determined. A self-registering machine is also much used, which, through the medium of clockwork, traces a curve on paper representing the successive changes in the height of the water. More than 900 tidal stations have been established on the Atlantic coast; and on the western coast observations have been made at frequent intervals for a distance of about 1,500 miles. The observations at the principal stations are continued through several years. Their investigation of course involves very laborious computations; the great object being to combine their results with theory, in such a manner as to furnish rules for the prediction of future results. The results of this branch of investigation in the survey have been published in the annual reports of the superintendent as the work has proceeded, showing the success which has attended the operation of the system. The report for 1856 contains tables of comparison of predicted tides of Boston harbor with the results of actual observation, in which the predicted times of high water coincide with

the times observed within four minutes. Such accurate results had never before been obtained; and this contribution to knowledge may be regarded as one of the most important of the present day. In the published tables we have the predictions of the height and times of high and low water for over 250 points on the Atlantic coast. On the Pacific coast predictions have been made with equal success for a great number of stations, and these are annually increasing in number. Prof. William Ferrel has developed a new method of calculating tides, of a purely dynamical kind. The method hitherto in use has consisted in supposing the water to be in a state of equilibrium under the attractions of the earth, moon, and sun, and then applying purely empirical corrections to the results so obtained. Prof. Ferrel has taken account of the fact that the water is in motion and has momentum. This was first done by Laplace, but unsuccessfully, because friction was neglected. Ferrel has taken account of this. His theory has been applied by himself, at the desire of the present superintendent of the coast survey, to the case of Boston harbor; and its superior accuracy has thus been demonstrated, as well as its great value in saving laborious calculations of empirical corrections. Prof. Peirce has given much study to the calculation of the effects of friction on tidal currents; and his results, combined with the original observations and researches of Mr. H. Mitchell, have produced a great advance in the theory of this subject, and important practical rules for draining tide lands, &c.—*Figure of the Earth*. The geodetic system of surveying originated in the efforts of philosophers to determine the precise figure and size of the earth. It is well known that the earth is not exactly spherical in shape, but is flattened slightly at the poles of the axis about which it revolves, this axis being about 26 miles shorter than the equatorial axis. The determination of the relative lengths of the earth's axes has been one of the most important physical problems of all ages. The dimensions of the earth are of course essential elements in the mathematical investigations connected with astronomy, and in the computations of trigonometrical surveys. The measurement of extended arcs of meridian and parallel furnish the best means of determining these lengths; and the problem has been considered of so much importance, that expensive expeditions have been fitted out, and surveys made in different parts of the world, for this object alone. But, although approximate determinations have been made, it cannot be said that the dimensions of the earth are definitely settled. The primary triangulation of the coast survey furnishes incidentally valuable contributions to science in this respect. An arc of the meridian 1,500 m. in length has been measured in India, one of 1,800 m. through Russia, extending from the Black sea to the Arctic ocean, and another of 900 m. in France,

from Dunkirk to the island of Formentera in the Mediterranean. Several arcs have also been measured in Germany; and in fact there is hardly a civilized nation that has not contributed its share to our knowledge of this subject. It was in the first attempts to measure the French arc that the science of geodesy originated. In the United States, an arc of the meridian has been measured by the coast survey, between the years 1844 and 1867. It extends from Nantucket in Massachusetts to Farmington in Maine, and is $3^{\circ} 23'$ in length. A second arc is in process of measurement between Ocracoke inlet in North Carolina and the head of Chesapeake bay. The northern part, which extends over Chesapeake bay, was completed in 1871, and is $2^{\circ} 40'$ in length. The total extent of the whole arc when completed will be about $4^{\circ} 32'$. Other arcs will be measured as the geodetic work advances.—*Variation of the Compass*. It is well known that every navigator determines his course and direction by means of an instrument called the mariner's compass, which depends solely upon the direction which a small needle or bar of steel assumes when magnetized and left free to move in any direction. This direction is nearly north and south; and it was formerly supposed that the north end of the needle pointed directly to the north pole of the earth, to which it was attracted by some powerful agent in the polar regions. Continued observation and study of the subject, however, disclosed the fact that this was not true. The real direction of the needle at any point between the equator and the poles is inclined to the horizon, and also to the true meridian; or, in other words, the needle has a dip and a variation or declination. At Key West, for instance, in 1858, the dip of the needle was 55° ; at Cape Hatteras, 68° ; at New York, 73° ; at Halifax, 76° ; while the declination was 5° E. at Key West, and 6° W. at New York; and between these places there is a line where there is no variation from the true meridian. This line passes near Wilmington, N. C., Charlottesville, Va., and Pittsburgh, Penn. Going westward from this line, the declination of the north end of the needle to the east of the true meridian increases rapidly until the Pacific coast is reached, when it is from 15° to 20° E. It is found also that the direction at any one place is not constant, but that it changes not only during each day, but from year to year. In surveyors' and mariners' compasses the dip of the needle is overcome by suspending it from a point above its centre of gravity; but the declination still exists, and gives rise to what is popularly called the variation of the needle. Surveyors on land have generally the means of ascertaining the variation by astronomical observations, by which very great errors in their maps may be avoided; but the common mariner has no such resource. In sailing from the gulf of Mexico to Portland, Maine, his compass would pass through all points from 5° E. to 13°

W. How is he to know this, unless it be put down on his chart? And how will a chart for one year answer for another, when the variation is constantly changing? It is plain that the laws which govern these changes must be found out, so that the changes may be predicted. The determination of these laws, and the actual direction of the needle at various points of the coast at particular times, have occupied the attention of the superintendents of the coast survey. It is impossible to explain here the delicate and laborious nature of the observations necessary for determining the direction and intensity of the magnetic force. The results published by the coast survey have been obtained by comparing the observations of many years with the deductions of theory, and may be said to exceed in importance and usefulness all that had previously been done in this country. From the results of observations made not only on the Atlantic and Pacific coasts, but also in the interior of the continent, a map has been constructed giving the lines across the continent along which the dip is the same, and along which the declination is the same, and corresponding lines for the intensity. From such results the laws are obtained for predicting future changes. From these facts the importance of a full investigation of a subject of such vital interest to navigation may be appreciated. As it forms a part of the duties of the coast survey to furnish the mariner with all the information possible on this subject, it ought not to be neglected even in a brief account of the work.—*Office Work*. The observations and charts made in the field are at the close of each season's work sent to the coast survey office in Washington, where they are combined to form the charts. The triangulation and astronomical observations are subjected to a double computation, first by the observers, and next by the computers in the office, in order to insure perfect accuracy and faithfulness. The topographical and hydrographical sheets are combined, and reduced drawings are made on scales suitable for publication. A connected series of charts of the whole coast is projected on a scale of $\frac{1}{80,000}$. Besides these, local charts of harbors and bays are published on larger scales, adapted to the importance of the locality and amount of detail to be shown. General coast charts are also published on a scale of $\frac{1}{400,000}$. When the reduced charts are drawn and verified, they pass into the hands of the engraving division of the office, where they are executed on copper. When the plates are completed, electrotype copies are taken of them, which serve for printing the charts, the original plates being preserved in the archives. The electrotyping establishment of the coast survey is very extensive, and one of the most successful in the world. It was in practical operation several years before the process came into general use, and considerable advances were made in the art at this establish-

ment. Photography is also employed to reduce the original charts to the scale of the intended publications, and a photographic establishment has long been a part of the office. For reducing maps from one scale to another and transferring their outlines to the engraving plate, an instrument called a pantograph has been for some years employed. This is a repeating machine composed of a number of arms acting upon each other as levers, with points for tracing and engraving, and mounted upon traverse wheels, for ease and accuracy of movement. This instrument can be set to any desired scale, representing the proportion which the map to be engraved bears to the original; and when so set, with the tracing point resting upon the original map and the engraving point upon the plate, if the former be moved over the map, the latter will reproduce upon the plate an absolutely exact copy of the original on the required scale. The advantage gained by dispensing with the old methods of reduction, which required an experienced draughtsman, at great expense, together with the greater accuracy resulting from but one operation in reducing from the original to the plate, is apparent when we consider the usual process of drawing, tracing, transferring, and entering by hand. Here are four distinct operations, each liable to more error than the one operation performed by the pantograph. The charts are finally printed at the office, and distributed for sale to agents in the principal seaports. The prices are fixed at very low rates, so as to place a complete set of charts within the reach of every navigator. Provision has been made by congress for the publication of the observations made in the progress of the survey, so as to place the data on which the correctness of the charts depends beyond the possibility of loss, and to submit them to the criticism of the world. — *Organization.* The operations of field work which have been described are carried on simultaneously at many points on the coast. The Atlantic and gulf coasts are divided into nine, and the Pacific coast into two sections, each having its triangulation, astronomical, topographical, and hydrographical parties, all working independently, but upon the same system; so that, in the end, the whole will form a connected survey from Maine to Texas, and from San Diego to the 49th parallel on the Pacific. Besides these sections, since the acquisition of the territory of Alaska, the coast survey has added that large extent of coast to its already extensive field of operations; and parties have been at work there regularly, carrying on reconnaissance, triangulation, topography, and hydrography, whenever the weather of that stormy region would permit. For conducting these operations there are employed in the coast survey, exclusive of hands and seamen, 94 civilians of different grades, and 11 officers of the navy, a number of the latter being required for vessels engaged in hydrography, which are

under naval discipline. This force does not include computers, draughtsman, engravers, and clerks employed in the office, all of whom number 93. The whole work is under the control of the United States treasury department; while the superintendent directs all the details of the work, governs the movements of the parties, and controls the expenditures. The expense is defrayed from annual appropriations by congress, made upon estimates submitted by the superintendent, which from 1853 to 1858 amounted to about \$200,000 for the Atlantic and gulf coasts, and about \$150,000 for the western coast. Of late years, however, the work has become so much extended, and the labors of the survey so much increased, as to necessitate a much larger expenditure, not a small item in which is the appropriations for new vessels to replace those captured and destroyed during the war, and those which have become worn out by long and arduous service. The progress of the work from year to year is given to the public in the annual reports of the superintendent. In these reports not only the results of the year's operations are given, but also the ways and means by which they are obtained. The liberality of congress in publishing and largely distributing these reports has tended greatly to increase the public interest in the work.—The investigations of the tides, the Gulf stream, the magnetic force of the earth, and the meteorological conditions of the atmosphere, have an equal bearing upon the interests of navigation and commerce and the sciences connected with the physical condition of the globe. But there are other practical results of the coast survey which have a more direct influence in protecting our commerce from the dangers by which it was formerly attended. A consideration of these results will exhibit the advantage of an intelligent application of true scientific principles in all works of this character. Previous to the year 1844, 300 vessels were wrecked annually on our coast, attended with a great loss of life. Of these vessels one sixth were destroyed on the Florida reefs. To illustrate the causes which led to this great loss of life and property, it will only be necessary to mention a few of the discoveries made in the survey of the coast. The position of the entrance to Delaware bay, between Cape May and Cape Henlopen, was found to be eight miles in error. Six dangerous shoals were discovered in one year in the vicinity of Nantucket, lying directly in the track of our European commerce, and of the heavy coast trade between the eastern and southern states. A new channel, with two feet more water than any other, was discovered in the entrance to New York harbor. Dangerous shoals were discovered at the entrance to Chesapeake bay, and along the coasts of Virginia and North Carolina. Innumerable other discoveries of no less importance have been made, but space forbids other mention of them. The few above given are sufficient to

show the inaccuracies of all our charts previous to the investigations of the coast survey. The means that have been applied to correct these great evils have not been incommensurate with the end. It may be said that advantage in economy is not the least of the practical results of the scientific methods of the survey. Compared with foreign surveys, it is not only more accurate in detail, but its results have been produced with a rapidity and economy altogether unprecedented. The English survey was commenced in 1791, and is still unfinished, the land work being as yet unconnected with the hydrography. The cost of that survey is more than four times the cost of ours. During the ten years previous to 1848, Great Britain expended for hydrography alone \$7,500,000. The total cost of the United States coast survey up to that time was only \$800,000, including land work and hydrography. At the present time, while the survey has extended its operations across the whole continent, and even included the distant domain of Alaska, its expenditures, including the cost of building a number of new vessels, have been comparatively small. With this small expense the survey has been extended so as to embrace the whole of our Atlantic, Pacific, and gulf coasts. During the year 1872 12 triangulation parties, 2 astronomical parties, 12 hydrographical parties, and 14 topographical parties were in the field on the Atlantic and gulf coasts, and 13 parties on the Pacific, besides the computers, draughtsmen, engravers, &c., employed in the office. Up to the present time (1873) 1,282 original topographical and 1,144 hydrographical sheets have been surveyed, and charts of 240 harbors on the Atlantic and gulf coasts, and of 100 harbors on the Pacific, have been published, besides 209 coast and sailing charts, great numbers of copies of which have been issued. An elaborate and careful "Coast Pilot" of the Atlantic coast is in process of preparation, and one has already been completed and published for Alaska and the Pacific coast.

COATZACOALCO, or *Goatzacoalcos*, a river of Mexico, rising in the unexplored part of the Sierra Madre, and flowing N. across the isthmus of Tehuantepec into the bay of Coatzacoalco, in the gulf of Mexico, in lat. $18^{\circ} 8' 30''$ N., lon. $94^{\circ} 17'$ W. It is the most important of the streams which water the N. slope of the isthmus, on account both of its numerous tributaries and its extensive basin, and of its position as a part of a projected channel of interoceanic communication. A commission sent out by the United States in 1850 ascended by small boats to the village of Santa Maria Chimalapa, $4\frac{1}{2}$ m. below its junction with the Chimalapilla; and in the winter of 1870-'71 it was again explored by a party under command of Capt. R. W. Shufeldt, U. S. N., who demonstrated the practicability of a canal by this route. About 45 m. below Santa Maria it receives the Malatengo on the west, and on the

same side, 22 m. further down, it is joined by the Sarabia. The Jumuapa enters 17 m. below, and next to it the Jaltepec, which is the principal tributary on the west, being navigable by canoes 50 m. at all seasons. The Chalchijapa joins on the east, $22\frac{1}{2}$ m. below the Jumuapa. Thence to the point of Horqueta, $40\frac{1}{2}$ m. further, the affluents are all small. After the junction of the Sarabia the hills become inconsiderable, and below the mouth of the Jaltepec the banks of the river are in few places more than 10 or 15 ft. high, and are often overflowed. The current is scarcely perceptible, and during the dry season shoals are met with having only 18 inches of water over them. At the Horqueta, 102 m. below the Malatengo, the river branches, and after forming the island of Tacamichapa, reunites. The W. branch is called the Mistan, the E. the Apotzongo. The former, which is the longer, is 34 m. long and has an average depth of $13\frac{1}{2}$ ft. The Coahuapa joins the river on the east, 10 m. below the junction of the branches; $4\frac{1}{2}$ m. below its mouth, on the W. bank, is the village of Minatitlan; and $4\frac{1}{2}$ m. below this the river Usapanapan, the most considerable of the many tributaries of the Coatzacoalco, joins it on the east. From the lower point of the island of Tacamichapa to the mouth of the Coahuapa the depth is $26\frac{1}{2}$ ft., and thence to the bar from 33 to 40 ft. The breadth between the same points is from 130 to 700 yards. It is thus navigable for about 35 m. for the largest ships. At the mouth of the river, which lies 115 m. W. of the mouth of the Tabasco, and $143\frac{1}{2}$ m. in a direct line from the harbor of Ventosa, on the Pacific coast of the isthmus, there is a bar, the soundings over which made by order of Cortes in 1520 gave the same results as those obtained in 1850 and in 1871. It appears to be of limestone rock, with a light covering of coarse sand, and has two passes, one 350 ft. wide and 13 ft. deep, and the other 100 ft. wide and between 11 and 12 ft. deep. The breadth of the stream at its mouth is 1,500 ft. Just within the bar is the little village of Coatzacoalco, which has grown up since 1855, and is now frequented by vessels engaged in the mahogany trade.

COBALT, one of the elementary metals. The word cobalt was formerly used to designate a whole group of worthless metals. The superstitious miners imagined that the genii of the mountains resisted all attempts to penetrate their mysteries, and threw all sorts of false ores and unripe metal in the way of the workmen, in order to discourage them from their undertaking. These mountain gnomes or sprites were called kobolds, and the miners gave their name to the worthless ore. The bright shining mineral that vexed the workmen so much was at one time supposed to contain bismuth, and was very little used. These are the first recorded notions, but there is little doubt that cobalt ores were used for coloring glass some thousands of years before in Nineveh, Thebes,

and Pompeii, as specimens found in those places resemble the beads and ornaments of modern times. The first really authentic discovery of cobalt appears to have been made in 1733, by the Swedish chemist Brandt, who called it "cobalt king." Chemical analysis had not at that time attained sufficient progress to enable any one to separate the constituents of ores with absolute certainty, and it was not till 1780 that the existence of cobalt was confirmed by Bergman. Cobalt is one of the metals found in the atmosphere of the sun and in meteorites. It usually occurs associated with nickel, arsenic, and sulphur, and is frequently an incidental product in the working of copper, bismuth, and nickel ores. The best known minerals are smaltine, called also speiss cobalt, cobaline, glance cobalt, cobalt bloom, and earthy cobalt. The fact that some of the minerals contain arsenic has led to the application of the name cobalt to the black arsenic sold as a fly powder.—Metallic cobalt may be prepared from the oxide by heating two parts of the pure oxide of cobalt and one part of pure cream of tartar for six hours in a covered crucible lined with charcoal, and at a temperature sufficient to melt steel. The regulus obtained in this way is exceedingly hard and brittle, has the color of bismuth, is magnetic, and has a specific gravity of 8.43. By remelting in a clay crucible, it can be freed from carbon, and it then has a silver-white color and a specific gravity of 8.754, is softer than steel, very elastic, does not oxidize in air nor after several days' immersion in water, and is as magnetic as iron. Becquerel found that by electrolysis a brilliant white metal goes to the negative electrode when the chloride of cobalt is first neutralized with ammonia. Prepared in this way, it is quite pure, and is malleable and magnetic. By treating an aqueous solution of the chloride of cobalt with sodium amalgam, an amalgam of cobalt is formed, from which the mercury can be expelled, and the cobalt obtained in the condition of a fine powder; it can afterward be fused to a pure regulus. The metal resembles steel with a slight red tinge, is very hard, and is said by Deville to be more tenacious than iron. This latter property may hereafter give a value to wires made of cobalt, where it is required to attain great strength in a small compass. Arsenic and manganese render it brittle. Like pure iron, it requires a very high heat to melt it, and the temperature of fusion appears to be between that of iron and gold. Its specific heat is 0.1096, and its density ranges between 8.513 and 8.7. At a high temperature it burns with a red flame, yielding an oxide. Acids generally dissolve cobalt, nitric acid being especially adapted to this purpose. The metal decomposes water at a red heat, but not at ordinary temperatures. Plunged into fuming nitric acid, it is converted into the passive state, the same as iron, and the duration of this passive state is augmented

by previously heating the metal. Antimony and cobalt fused together evolve heat and light, and afford an iron-gray alloy. The alloy of cobalt and iron is exceedingly hard. Gold and cobalt yield a yellow and very fragile alloy. The alloy of platinum and cobalt is fusible. Cobalt amalgam is white, like silver, which is rendered brittle by it. Alloys of lead and cobalt and tin and cobalt have been made, but possess little interest. Many chemists suppose nickel to be an alloy of cobalt and some other metal. Fairbairn found that the tenacity of cast iron was greatly reduced by its admixture with nickel, and the same result is probable in the case of cobalt. The latter metal is said to reduce copper from solutions. Weiske found that cobalt was contained in nearly every brand of commercial iron examined, sometimes to the extent of 7 grammes in 100 pounds. Finely divided metallic cobalt is soluble in a boiling solution of caustic potash, and yields a blue liquid, which is supposed to contain cobaltic acid. The finely divided cobalt for this purpose is prepared by heating an intimate mixture of pure oxide with 10 to 12 per cent. of starch meal, or by reducing the oxide with hydrogen. Cobalt contaminated with phosphorus has a different color from ordinary metal, and loses its lustre in the air.—The oxides and salts of cobalt are distinguished for their beautiful colors, red, blue, yellow, and green; hence they were early used as pigments. If a little oxide of cobalt be added to melted glass, we obtain a mass which after cooling is intensely blue. When this is ground to powder, it yields the well known smalt, which at one time was extensively employed by paper makers and in the laundry. The color is very fast, as it is not affected by the atmosphere, or by acids or other liquids; and this fact afforded a method of detecting adulterations, as sand or pulverized glass which was simply immersed in some coloring liquid could easily be washed clean by acid. Since the extensive and cheap manufacture of artificial ultramarine was established, the demand for smalt has greatly diminished. There is another blue color formed by the union of alumina and the oxide of cobalt, known as Thénard's blue, which has long been applied in the arts, but, in consequence of its high price, cannot compete with ultramarine. It can be prepared by mixing 3 parts freshly precipitated moist phosphate or arsenate of cobalt with 12 to 15 parts, also freshly precipitated, of hydrate of alumina, and exposing after drying to a red heat. Thus produced, it is a compact insoluble mass, which can be ground to a fine blue powder. Rinmann's green is a compound of the oxides of zinc and cobalt. It is a much prized green pigment. A beautiful yellow color is produced by mixing the nitrate of potassium with a solution of cobalt; a double nitrate of cobalt and potash is produced, in the form of an insoluble yellow crystalline body, which is not only of value as a color, but of-

fers a remarkably delicate test for the presence of cobalt in solutions. This yellow has been used sparingly, on account of its cost, in aqua-
relle and oil painting. By precipitating cobalt with phosphate of soda, we have a red-violet color, the shade of which varies according to the temperature at which it is prepared. A fine cobalt brown is produced by calcining a mixture of sulphate of cobalt, ammonia, and iron. Some of the salts of cobalt are red when they contain water, and blue when they are anhydrous. This property is made use of in what is called sympathetic ink. If we write with a dilute solution of chloride of cobalt on paper, and allow the tracings to dry at ordinary temperatures, the letters will be scarcely visible. Upon the application of heat the writing becomes visible, with a blue color, or sometimes green if nickel be present; the color again disappears on the absorption of moisture. A fine green color is produced by precipitating cobalt from its solutions, by means of a mixture of prussic acid and potash; but the cost of production must prevent any extensive application of this color. Since the discovery of photography, the use of cobalt-blue glass has greatly increased. It is an interesting fact in optics that blue glass permits all the chemical rays of light to pass freely through it, while the yellow are intercepted. Pieces of blue glass are used to eliminate the yellow rays when the colors of flames are to be examined for the violet hue of potash, and in other cases of optical research. The oxide of cobalt, prepared by precipitating the chloride with potassa, has been employed in rheumatism; it is emetic in doses of 10 to 20 grains. The salts of cobalt are irritant poisons. The employment of metallic cobalt in the manufacture of German silver would make that article too expensive for general use; but in small quantities it enters into alloys, in association with nickel, as an incidental component. The deposition of metallic cobalt by the battery can be accomplished the same as is now so extensively done with nickel, and this method is sometimes employed to procure small quantities of the metal. Some of the salts of cobalt are of great value to the chemist in his laboratory, as affording delicate tests for the presence of other bodies. One of the methods for the manufacture of oxygen from bleaching powders is founded upon the somewhat obscure formation and subsequent decomposition of cobaltic acid. A very small quantity of a solution of cobalt suffices to evolve all of the oxygen from a given quantity of chloride of lime. The ammoniacal compounds of cobalt were prepared and fully studied by Genth and Gibbs. The nitrate of cobalt is sometimes employed as a reagent for the blowpipe. The compounds of cobalt are easily recognized by the intense blue color which they communicate to a bead of borax in the oxidating flame. Zaffre or safflor is a mixture of roasted ore and quartz, used in pottery.

COBAN, a city of Guatemala, capital of the department of Vera Paz, on the left bank of the Rio Dulce, near its source, in lat. 15° 30' N., lon. 90° 30' W., 55 m. N. of the city of Guatemala; pop. about 15,000. It is situated in a remarkably fertile valley, covered with thriving plantations of sugar cane, bananas, and pimento and fruit trees. The inhabitants, chiefly Indians, are industrious and wealthy.

COBB, a N. W. county of Georgia, bounded S. E. by the Chattahoochee, and drained by several creeks; area, 529 sq. m.; pop. in 1870, 13,814, of whom 3,217 were colored. The surface is hilly, and in part mountainous. The soil is fertile. The rocks are granitic and metamorphic, and produce gold. The Western and Atlantic railroad intersects the county. The chief productions in 1870 were 58,296 bushels of wheat, 215,522 of Indian corn, 23,182 of oats, 130,650 lbs. of butter, and 1,972 bales of cotton. There were 893 horses, 799 mules and asses, 1,784 milch cows, 3,035 other cattle, 2,843 sheep, and 10,897 swine; 2 manufactories of cotton, 1 of woollen goods, 1 of paper, 2 wool-carding and 3 leather-carrying establishments, 1 flour mill, 4 saw mills, and 4 tanneries. Capital, Marietta.

COBB, Howell, an American politician, born at Cherry Hill, Ga., Sept. 7, 1815, died in New York, Oct. 9, 1868. He graduated at Franklin college in 1834, and was admitted to the bar in 1836. In 1837 he was elected by the legislature solicitor general of the western circuit. He began his congressional career in 1843, having been elected to the house of representatives, in which by three successive reelections he sat till 1851. He was distinguished for his familiarity with the rules of the house, his skill as a debater, his strong professions of attachment to the Union, and his equally earnest advocacy of state rights. He became the leader of the southern party in the house, and upon the assembling of the 31st congress in December, 1849, he was elected speaker after a violent contest. He demanded the extension of slavery into California and New Mexico by federal authority, and supported the compromise measures of 1850. In 1851 he was elected governor of Georgia, defeating the candidate of the extreme southern rights party, which opposed the compromise. At the expiration of his term in 1853 he resumed the practice of the law, but in 1855 was again elected to congress, and in 1856 made a tour through the north to support the election of Mr. Buchanan. In March, 1857, he became secretary of the treasury in President Buchanan's cabinet, and held that office till Dec. 10, 1860, when he resigned to engage in the secession movement. In February, 1861, he became president of the confederate congress assembled at Montgomery, Ala., and afterward transferred to Richmond, but retired Feb. 18, 1862, on account of misunderstandings with Jefferson Davis. Subsequently he was commissioned a major general, but took little part in military

movements. After the close of the war he continued hostile to the reconstruction policy of the government. He died suddenly of heart disease, while on a visit to New York.

COBBE, Frances Power, an English authoress, born in Dublin in 1822. She is of English extraction, her father having derived his estates from his great-grandfather, Charles Cobbe, who was archbishop of Dublin. Her attention was early directed to theological studies, and after a wide course of reading she became deeply interested in the writings of Theodore Parker. Upon the death of her mother, which occurred while she was still young, she made inquiries of Parker in regard to a future existence. His reply was contained in his "Sermon of the Immortal Life." She became his warm friend and admirer, and edited the excellent English edition of his works. After her father's death she visited Italy and the East, and as the fruits of her travels wrote "The Cities of the Past" and "Italics" (London, 1864). On returning to England she assisted Miss Mary Carpenter for a time in the Red-house reformatory. Her labors were soon discontinued in consequence of an accident, but they furnished her with the materials for several papers upon the condition of the poor and friendless, which, after appearing as pamphlets and in magazines, were published with other essays under the title of "Studies New and Old of Ethical and Social Subjects" (1866), and "Hours of Work and Play" (1867). In 1860 she made a second visit to Italy, and was with Theodore Parker at Florence during the last days of his life. Since his death she has been an earnest exponent of his religious ideas. Besides contributing largely to various periodicals, in some of which her sympathy for the United States during the civil war was manifested, she has written much on moral and religious subjects. In "Broken Lights" (1864) may be found a statement of the doctrines of the different divisions of the English church, and also a discriminating view of the writings of Renan. In her "Essay on Intuitive Morals" (1859), perhaps her ablest production, she controverts with great force of reasoning the utilitarian theory of ethics as set forth by its English advocates. Her book entitled "Religious Duty" (1865) may be considered as a sequel to this essay. Her latest work, entitled "Darwinism in Morals, and other Essays" (London, 1872), treats of unconscious cerebration, dreams, and other questions of psychology. Miss Cobbe's present residence (1873) is in London, where she holds a prominent place in philanthropic and reformatory movements, as well as in literature.

COBBETT, William, an English political writer, born at Farnham, in Surrey, March 9, 1762, died near Farnham, June 18, 1835. His father, who for many years kept an inn at Farnham, and farmed a piece of land in the neighborhood, taught him reading, writing, and arithmetic, and employed him in the fields

from early boyhood. At the age of 20 he vainly endeavored to enter the navy. In the following year he made his way to London, where he became copying clerk in an attorney's office, which employment he found so irksome that he enlisted in the 54th infantry regiment in 1784. He was sent to Chatham, where he remained for a year, during which time he read much, studied grammar, and rose to the rank of corporal. Accompanying his regiment to New Brunswick, his good conduct during the following three years was such that at the age of 25 he was promoted, over 30 sergeants, to the rank of sergeant major. The regiment returned to England in 1791, after which at his own request he obtained his discharge, with excellent testimonials from his superior officers. On Feb. 5, 1792, he married at Woolwich the daughter of a sergeant major with whom he had been acquainted in New Brunswick. Soon afterward they went to France, but on account of the revolution returned to England in six months, and soon sailed for the United States. At Philadelphia, under the name of "Peter Porcupine," he wrote several political pamphlets in favor of England, and opposed to French principles. He opened a shop for the sale of his own compositions, among them one attacking Dr. Rush, who brought a suit, and obtained a verdict of \$5,000 damages. In 1800 Cobbett returned to London, opened a book shop in Pall Mall, published the "Works of Peter Porcupine" in 12 volumes, and established a daily paper called "The Porcupine," in which he supported Mr. Pitt's administration. This journal was short-lived, and on stopping it Cobbett commenced the "Weekly Political Register," the publication of which was continued without interruption till his death. The sale of the "Register" became so large that Cobbett was soon enabled to acquire Botley, a large farm in Hampshire, where he resumed a country life, giving a few hours daily to his editorial duty. He was prosecuted and convicted for various libels on the government and individuals. In July, 1810, he was convicted of a libel for denouncing the flogging of English militiamen by German soldiers, and sentenced to two years' imprisonment in Newgate, with a fine of £1,000. The money was raised by subscription, but he had to suffer the full sentence of imprisonment; and though he continued to write in prison (among other productions, his famous currency book, "Paper against Gold"), his income suffered greatly. In 1816 he began an occasional publication called "Two Penny Trash," whose sale rose to 100,000 copies. Its influence with the working classes was so great that the "six acts" were passed in 1817 for the express purpose of preventing public meetings, and of silencing the independent press. Cobbett retreated to the United States, dating his subsequent "Registers" from Long Island, where he leased a farm, until the repeal of the particular statute which he feared might be put in

force against himself. Returning in December, 1819, he added more to his notoriety than popularity by bringing with him the bones of Thomas Paine. He had formerly denounced Paine as a regicide and infidel, and now urged the English people to give him a grand funeral and a splendid monument. In 1820, during the prosecution of Queen Caroline for adultery, Cobbett is said to have been her secretary, writing her replies to addresses, as well as her celebrated letter to the king. He now took a farm at Kensington, where he cultivated American trees and plants, Indian corn included, which he thought might be useful to England, and to which he tried to give the name of "Cobbett's corn." In the following ten years he wrote many books, each of which obtained a large sale. Most remarkable among these are his "History of the Protestant Reformation in England and Ireland," with such a Roman Catholic bias that it has been translated into French and Italian; English and French grammars, written with great clearness; "Advice to Young Men and Women," containing many charming passages of autobiography; "Treatise on Cobbett's Corn;" "Emigrant's Guide;" "Cottage Economy;" "Village Sermons;" "A Year's Residence in America;" "History of England," &c. He also edited various other books. Early rising, temperate living, concentrated industry, and health preserved by much outdoor exercise, enabled him to get through a greater quantity of brain work than any other author of his day, Scott not excepted. Besides the weekly writing of his "Register," he compiled 20 volumes of parliamentary debates. He strongly condemned the currency views of Peel, and as strongly advocated Catholic emancipation, granted in 1829, and parliamentary reform, completed in 1832. In July, 1831, while the reform excitement was agitating England, the whig ministry brought Cobbett to trial for what the attorney general (Denman) described as a seditious libel, exciting agricultural laborers to destroy corn, machinery, and other property. Cobbett, who conducted his own defence, made a very damaging attack on the whig government. After 15 hours' deliberation, the jury, equally divided in opinion, could not give a verdict, and were discharged, which ended the trial. At Coventry in 1820, and at Preston in 1826, Cobbett had unsuccessfully attempted to be returned to parliament. In December, 1832, chiefly through the influence of Mr. John Fielden, a resident wealthy manufacturer of that borough, he was elected for Oldham, when 70 years old. In the following session he moved resolutions on the currency, in which there was offensive mention of Sir Robert Peel. Not only was his motion negatived, but the commons ordered the resolutions to be discharged from their minutes. He made no impression in parliament, and had no influence. At the general election in December, 1834, he was again returned to parliament

for Oldham. Unaccustomed labor, performed at late hours in a heated atmosphere, soon told upon a man far advanced in age, whose previous boast had been that he rose at 4 and went to bed at 9. He had a sudden attack of disease of the heart during a debate on the malt tax, on May 25, 1835, was removed to his country residence near Farnham, and survived only three weeks. He was buried in the churchyard of his native town, by the side of his father and mother. In 1856 a tomb was erected over the slab which had hitherto covered his grave. As a politician Cobbett was unstable and inconsistent, but always wrote with great power. As an author he stands very high. Southey declared that there never was a better or more forcible English writer. In public his pen seemed almost against every one. In domestic life he was a faithful husband and most affectionate and indulgent parent. In 1842 his son published, in six volumes, with notes, a selection from Cobbett's political works. In 1848 this was extended to nine volumes.—See "Biographies of John Wilkes and William Cobbett," by the Rev. John Watson (London, 1870).

COBDEN, Richard, an English statesman, born at Dunford, near Midhurst, Sussex, June 3, 1804, died in London, April 2, 1865. On the death of his father, a small farmer, he was taken charge of by his uncle, a warehouseman in London. Before he entered business on his own account he saw much of England as a commercial traveller, visiting also Egypt, Turkey, and Greece in 1834, and the United States in 1835. By this time he had become partner in a cotton-printing establishment near Manchester, and built up a prosperous business. In 1835 he pronounced the leading address at the opening of the Athenæum of Manchester, which he had helped to establish. He also published two pamphlets, "England, Ireland, and America, by a Manchester Manufacturer," and "Russia." In the latter he questioned the extent of the vast resources generally attributed to Russia. In 1837, after having unsuccessfully contested the representation of the borough of Stockport, Mr. Cobden visited France, Belgium, and Switzerland. In 1838 he travelled through Germany, and on his return strongly declared in favor of free trade. In 1839, when the house of commons rejected a motion for the repeal of the bread tax, Mr. Cobden took a leading part in establishing the well known and powerful anti-corn-law league. He was elected for Stockport in 1841, and immediately obtained a high place among the leading parliamentary speakers, from his oratorical ability and from the great extent and variety of his knowledge upon all subjects connected with trade and commerce. He spoke and voted in parliament for the repeal of the corn laws, and spoke and lectured in most of the counties of England on the same subject. Meanwhile the anti-corn-law league grew into power and popularity, strengthened

with vast funds raised by the free-traders. Sir Robert Peel finally became a convert to the necessity of a change, and, with much opposition from the agricultural interest, succeeded in procuring the passage of the memorable act for repealing the duties on the importation of corn, to which the royal assent was given June 26, 1846. Driven out of power immediately after by a hostile vote on his Irish policy, Peel took leave of office in a speech which contained a handsome acknowledgment that the repeal of the corn laws was chiefly attributable to Mr. Cobden. National gratitude shortly after presented Mr. Cobden with a substantial pecuniary acknowledgment, raised by subscription, to the amount of £80,000, on the receipt of which he retired from business, and purchased the property near Midhurst on which he had been born, and which his family had formerly owned. While absent in 1846-'7 on a continental tour through France, Spain, Italy, Germany, Russia, and Sweden, he was reelected member of parliament for Stockport, and also for the West Riding of Yorkshire. He decided to sit for the great county rather than for the small borough. He was reelected in 1852. As an active member of the peace society, he had advocated the propriety of deciding national disputes by arbitration rather than by arms, and had published several pamphlets strongly urging these views. He discountenanced the war with Russia, which his constituents supported. In 1857 he was one of the majority which passed a vote of censure on Lord Palmerston for entering into the war with China, which caused his rejection by the electors of the West Riding. Soon afterward he went abroad, and spent nearly two years on the continent and in the United States. During his absence he had been returned to parliament from the borough of Rochdale, and upon his return in 1859 he was informed that Lord Palmerston had offered him a seat in his cabinet as president of the board of trade. This office he declined, on the ground that his views had always differed so much from those of the premier that he could not consistently serve in his cabinet. In 1860, however, he consented to act as commissioner in negotiating a treaty of commerce with France, in which he was entirely successful. This treaty was regarded as a great triumph of diplomacy, but it was abandoned by the French in 1872. Mr. Gladstone, speaking in 1866, said in regard to it, "I don't believe that the man breathed upon earth at that epoch, or now breathes upon earth, that could have effected that great measure, with the single exception of Mr. Cobden." After the negotiation of the treaty he was offered a baronetcy and a seat in the privy council, both of which he declined. The frail state of his health prevented his taking so active a part in public affairs as he had formerly done; nevertheless, he made occasional speeches in parliament, urged the repeal of the paper duty as a tax on knowledge, and the re-

duction of the national expenditure, particularly in the military and naval departments. He was always the earnest and consistent friend of the United States, never lost faith in the cause of the Union during the civil war, and vigorously opposed all schemes for recognizing or aiding the confederacy. Mr. Cobden was, with John Bright, a leader of the Manchester school or party, and, besides the measures above alluded to, favored electoral reform and the vote by ballot. A marble statue of Cobden has been erected in the town hall of Bradford at the expense of Mr. Booth, an American merchant of that town. His works have been collected under the titles of "Political Writings of Richard Cobden" (2d ed., London, 1867), and "Speeches on Questions of Public Policy," edited by Bright and Rogers (1870). His biography has been written by J. McGilchrist (London, 1865), and in German by Von Holtzendorff (1866) and De Roth (1867).

COBI, Desert of. See Gobi.

COBIJA, or **Puerto la Mar**, the only seaport town of Bolivia, capital of the department of Atacama or Cobija, on the Pacific coast, in lat. $22^{\circ} 32' 50''$ S., lon. $70^{\circ} 17' 5''$ W., 365 m. S. W. of Potosí. The town is on the beach, at the foot of a range of high hills. On a point jutting into the sea is a small fort, mounting five or six guns. The harbor affords good anchorage, but landing is difficult on account of the surf. Efforts have been made to improve it of late by the erection of a mole. The town is a wretched place, composed of a few wooden houses, the principal of which are on a street running N. and S. along the shore. Water is scarce and of poor quality. The port is free, and is much visited by vessels of various nations, as it is the chief outlet for the exports of the country, and through it the southern provinces are supplied with foreign commodities. The only road from the seacoast to the interior in Bolivia is that from this port to Oruro, and it is constantly traversed by beasts of burden, bringing coin, bullion, ore, and other products from the interior, and carrying imported goods inland. A railway to Potosí has been planned, and if built will add greatly to the prosperity of the place, which is dependent on the mines. These mines, which are chiefly of silver and copper, are mostly in the hands of English capitalists, who import everything used by them.—Until 1829 Cobija was a mere fishing village, inhabited by Indians. It was made a free port in that year, and in 1839 it became the capital of the department. In 1855 it had a population of about 600, which had grown in 1858, in consequence of increased activity in mining, to 2,300. It has now about 2,500 permanent residents and a floating population of as many more. In official documents the town is called Puerto la Mar.

COBLENTZ (Ger. *Coblenz* or *Koblenz*; anc. *Confluentes*), a fortified city of Prussia, capital of the province of the Rhine, at the confluence of the Rhine and Moselle, 49 m. S. E. of Co-

logne; pop. in 1871, exclusive of the garrison, 24,528. A Gothic freestone bridge of 14 arches, erected in the 14th century, crosses the Moselle; and one of boats, across the Rhine, leads to the fortress of Ehrenbreitstein, on the E. bank. There is also an iron railway bridge across the Rhine, built in 1866. The fortifications are constructed partly on the system of Vauban, partly on that of Montalembert, and are capable of accommodating 100,000 men, and the magazine will hold provisions for 8,000 men

for ten years. Among the public buildings, the church of St. Castor is notable as the place where in 843 the grandsons of Charlemagne met to apportion the empire. An active trade is carried on in colonial produce, corn, iron, potters' clay, mineral waters, bark, and chiefly sparkling Rhine and Moselle wines. Manufactures also flourish to some extent. The city consists of the old and the new town, the latter being the more pleasant. The palace in the new town, a royal summer residence, is a



Railway Bridge between Coblenz and Ehrenbreitstein.

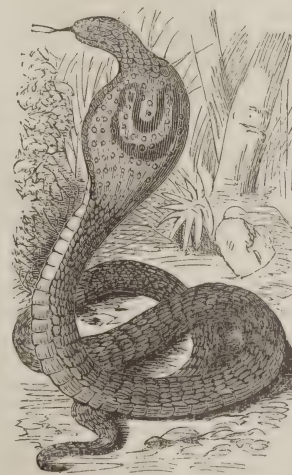
fine structure, erected about 1780 by the last elector of Treves; it was for some time used by the French as a barrack. The Protestant church has some fine specimens of early painted glass. The casino contains an elegant ball room and good reading rooms. There is a hospital conducted by the sisters of charity, and a town library, with valuable collections of coins, paintings, and antiquities. The environs of Coblenz embrace some of the finest scenery of the Rhine valley. During the French revolution the *émigrés* made their headquarters at Coblenz; many of them settled permanently in the town, which consequently contains more infusion of French blood than perhaps any other Rhenish town. Prince Metternich, Prof. Görres, and Henrietta Sontag were born in Coblenz.

COBOURG, Canada. See COBURG.

COBRA DE CAPELLO (hooded snake), the Portuguese name of the *naja tripudians* (Merr.), a venomous serpent of the East Indies, so called from its habit of dilating the neck into a kind of hood, covering in part the head; it has also received the name of spectacle snake, from the peculiar coloration on the back of the dilated hood. The family to which this serpent belongs seems to establish the transition between the genus *coluber* and the true venomous serpents; for, though armed with poisonous fangs, they have not the external characters of *trigonocephalus*, *crotalus*, and *vipera*, such as heavy forms, large triangular heads, and carinated scales; on the contrary, the form is slight and graceful, the head small and rounded, and the scales smooth; like *coluber*, they have the top of the head covered with nine plates. The

poison apparatus is less developed than in the rattlesnake, and its excretory duct is shorter and unfolded; the long processes of the vertebrae are smaller and indicate less muscular strength than in the true venomous serpents; the bones of the head are less movable; the

fangs are fixed in the jaws, which are capable of only moderate extension; and the whole aspect indicates a gentleness and docility which it is well known they possess. The cobra de capello has been known for centuries as possessing the power of dilating its neck, which is marked in a peculiar manner, and as being the dangerous playmate of the Indian jugglers.



Cobra de Capello.

The dilatation of the neck depends on the length and straightness of the ribs of this part; at rest, they are directed backward, but when drawn forward they assume a horizontal direction, and thus spread laterally the integuments of the neck; this dilatation extends from the head to about the 10th vertebra, gradually dimin-

ishing upward and downward from the middle of this space. This power of dilatation is possessed by many other serpents to a less degree. The two white spots with a black centre, united in front by a curved line, are rarely so distinct as to resemble spectacles, being generally irregular black marks which the imagination could transform into a great variety of semblances; they are most distinct when the hood is dilated, and are probably due to the arrangement of the scales consequent on the forced raising of the ribs. Two spots are sometimes seen on the lower surface of the neck. These colorations are not sexual differences, as they occur both in males and females. The general color of this serpent is a brownish yellow, of various degrees of brightness; the young often have the body with black bands and white spots. The total length is from 3 to 4 ft., and the thickness a little more than an inch; the tail is short, robust, and conical; the trunk is cylindrical and strong, as indicated by the agility of its movements. When attacked it raises itself boldly, supporting the trunk on the tail placed horizontally on the ground; then, with body bent, dilated neck, and threatening head, it presents quite a formidable appearance. It devours toads, frogs, birds, small animals, and also other snakes. In confinement they often utter a peculiar cry, described by a traveller, in whose apartment one of these snakes was catching rats at night, as a "strident sound, the attempted imitation of which resembled the acute staccato note of a treble hautboy." This species is found throughout the East Indies, and on many of the islands of the Indian archipelago, varying somewhat in color according to locality; it is nocturnal in its habits, and very frequently enters houses in search of its prey. The specific name *tripudians* (dancing) given to it by Merrem indicates a frequent use made of it by the Indian jugglers, to the great surprise of the uninitiated; the poison fangs are first extracted, so that their bite is quite harmless, though the exhibitors pretend to employ powerful antidotes; the serpents are trained to execute certain movements corresponding to the motions of the jugglers, keeping time to the musical accompaniment, and resembling a rude dance. The poison of the cobra, though less virulent than that of the rattlesnake, is exceedingly dangerous; from the experiments of Dr. Russell, in his work on the serpents of India, it appears that its poison proves fatal to a dog in less than 27 minutes, and to a chicken in less than half a minute; inserted by incision or inoculation, it is equally dangerous. Unless remedies are speedily applied, the bite of the cobra is generally fatal to man. According to Dr. Davy, its poison has an acrid taste, paralyzes the iris of fowls when applied to their eyes, and is soon exhausted by biting; it produces fainting, coldness, convulsions, and death, the lungs being generally found gorged with blood and serum. After the mechanical means of removing the poison have been tried,

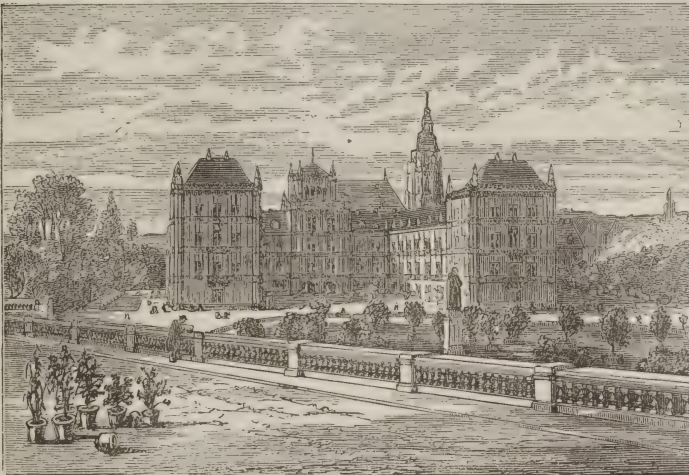
such as ligatures above the wound to prevent the return of venous blood, sucking the bitten part, excision, cauterization, or the application of cupping glasses, the constitutional remedies are, in the first place, diffusive stimulants, to support the prostrated nervous energy which invariably accompanies such bites; such are ammonia alone, or, as *eau de luce*, in combination with tincture of oil of amber, or even simple alcoholic stimulants in large and repeated doses, which have been found to prevent the fatal effects of the more virulent poison of the rattlesnake. The favorite remedy in the East Indies is arsenic, either in the famous Tanjore pills, each of which contains about one grain of arsenic, or in Fowler's solution, which contains the arsenite of potash; experience has shown the efficacy of the pills in some cases reported by Dr. Russell, where no other remedy was employed, and they might prove as beneficial in the bites of other venomous serpents. This cobra has received a number of native names, one of the most common of which is *goomna*. Several interesting experiments with the poison of the living cobra, some made in Boston in 1871, are given in the "Proceedings of the Boston Society of Natural History," vol. xiv. Such is the rapidity with which the poison is introduced into the blood that antidotes are rarely of any avail, though the fatal result may not occur for several hours. The cobra avoids using its fangs as much as possible except when securing its food, and rarely if ever bites unless trodden upon. The idea that the poison of the cobra has no effect upon the mongoose, or that the latter if bitten finds an antidote in certain plants, is entirely erroneous; the mongoose, if bitten, dies as soon as any other animal; the fact is that this agile creature avoids the bite of the sluggish reptile, and always seizes it by the back of the head, destroying it instantly. The cobra exhibited in Boston had eaten nothing for seven months, and yet seemed in good condition.—The *N. haje* (Linn.), found in Egypt and also in southern Africa, has sometimes been erroneously called cobra de capello, which might lead to the supposition that the true serpent of this name extended its area of distribution into Africa. (See Asp.)

COBURG. I. A duchy of Germany, forming with Gotha the united duchy of Saxe-Coburg-Gotha, one of the states of the empire; area of Coburg alone, 218 sq. m.; pop. in 1871, 51,709. (See SAXE-COBURG-GOTHA.) II. The capital of the duchy, and alternately with Gotha the residence of the duke and seat of government of Saxe-Coburg-Gotha, situated on the Itz, 185 m. S. S. W. of Berlin; pop. in 1871, 12,819. The streets are generally narrow, but there are some pleasant public walks. There are five Protestant churches and a Roman Catholic chapel, a gymnasium, an orphan asylum, an institution for the deaf and dumb, three hospitals, and a public library of 26,000 volumes. The Ehrenburg palace, one

of the residences of the duke, built in 1549, has a picture gallery, valuable collections of engravings, coins, antiquities, and minerals, and a library of 27,000 volumes. The government house is a handsome structure in the Italian style. There are a town hall, arsenal, theatre, and riding school. On an eminence overhanging the town is an ancient castle of the dukes of Coburg, now in part converted into a prison and house of correction; but some of the chambers remain in their original condition, among them those occupied by Luther when concealed in the castle, where he com-

part of Wallachia, including Bucharest. In the wars with France in 1793 and 1794 he took a successful part, defeating the French at Neerwinden and capturing Condé and Valenciennes, but eventually he was defeated at Maubeuge and Fleurus.

COBURG FAMILY, a family of sovereign German dukes, originating in the 15th century, now celebrated for intermarriages with European royal families. A sister of Duke Ernest I., who died in 1844, was the duchess of Kent, mother of Queen Victoria; and his brother Leopold, whose first wife was a daughter of George IV. of England, and his second wife a daughter of Louis Philippe, became the first king of the Belgians; while Albert, son of Duke Ernest I., and brother of the reigning duke of Coburg, Ernest II., was the consort of Queen Victoria. One of the nephews of Ernest I., Ferdinand, was consort of the queen of Portugal, and after her death (1853) for some time regent of the kingdom; and another, August, married Marie Clémentine, a daughter of Louis Philippe, while his niece, Victorie, became the wife of the duke de Nemours.



Ducal Palace, Coburg.

posed some of his best works, and in which are his bedstead and pulpit. During the thirty years' war the castle was unsuccessfully besieged by Wallenstein. Coburg has several dye works and breweries, and some manufactures of potash, glass, cotton and woollen goods, and toys.

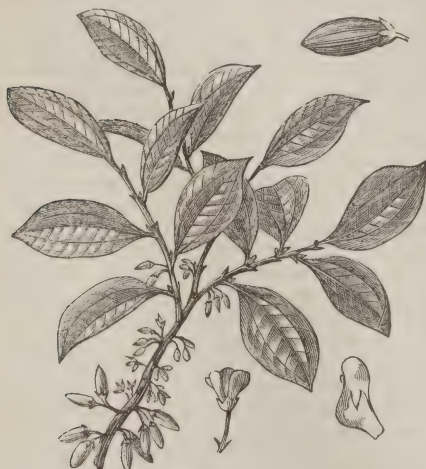
COBURG, a town of Northumberland co., Ontario, Canada, on Lake Ontario and the Grand Trunk railway, 63 m. E. N. E. of Toronto; pop. in 1871, 4,422. It is the capital of the united counties of Durham and Northumberland; is lighted with gas, has an artificial harbor, and a town hall, with county and town offices. Victoria college, having university powers, is situated here, the faculty of law being at Montreal and that of medicine at Toronto. It is the terminus of the Coburg, Peterboro', and Marmora railway company, on which much iron ore is carried for shipment. In summer the lake steamers call here daily. The exports in 1871 amounted to \$436,988; imports, \$95,770.

COBURG, or **Saxe-Coburg**, Josias, prince of, an Austrian field marshal, born Dec. 26, 1737, died Feb. 26, 1815. In 1788 he commanded the Austrian army against the Turks, and after the conquest of Khotin, and the victory at Fokshany, he entirely routed the Turks near Martinestie, and took possession of the larger

COBWEB, the delicate silken thread woven by the spider, and applied to various uses by the different species. Some form of it webs in which to entangle their prey, others use it as a lining for their habitation, and others make with it a soft nest for their eggs. Each thread which we see with the naked eye is formed of thousands of minute strands, which, coming separately from the body of the spider, unite at a short distance from it, not by twisting, but by their glutinous nature. The webs of different species of spiders are of various construction, adapted to the nature and habits of the creature. Some are very remarkable for their tenacity, being sufficiently strong to catch small birds. Sir George Staunton, in his "Embassy to China," states that spiders' webs are met with in the forests of Java of so strong a texture as to require to be cut through with a knife. In the "American Journal of Science," vol. xxvii., p. 307, is an account of a live striped snake suspended in a web by the tail, which was tied in a knot. Three spiders appeared to have accomplished this feat, having spun a cord of great size to connect the snake with the centre of the web above; they had also securely tied up the mouth of the reptile by a multitude of threads wound around it.—Cobwebs have been applied to various uses. The delicate

cross hairs in the telescopes of surveying instruments are fine webs taken from spiders of species that are especially selected for their production of an excellent quality of this material. The spider, when caught, is made to spin his thread by tossing him from hand to hand, in case he is indisposed to furnish the article. The end is attached to a piece of wire, which is doubled into two parallel lengths, the distance apart exceeding a little the diameter of the instrument. As the spider hangs and descends from this, the web is wound upon it by turning the wire round. The coils are then gummed to the wire and kept for use as required. About a century ago, Boa of Languedoc succeeded in making a pair of gloves and a pair of stockings from the thread of the spider. They were very strong, and of a beautiful gray color. Other attempts of the same kind have been made; but Réaumur, who was appointed by the royal academy to report on the subject, stated that the web of the spider was not equal to that of the silkworm either in strength or lustre. The cocoons of the latter weigh from three to four grains, so that 2,304 worms produce a pound of silk; but the bags of the spider when cleaned do not weigh above the third part of a grain, so that a single silkworm can accomplish the work of twelve spiders. It has been said that the spider web is beneficial in intermittent fever, asthma, and hysteria; but careful modern observation has not confirmed the statements heretofore made as to its extraordinary therapeutic virtues.

COCA, the dried leaf of the shrub *erythroxylon coca*, or, as in Prescott's "Conquest of Peru," "*erythroxylum Peruvianum*, or *cuca*, as called by the natives." This plant is found wild in the mountainous regions of Peru and Bolivia, and



Coca.

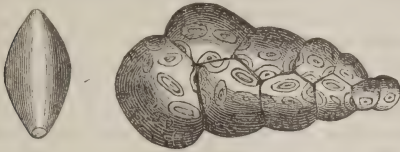
is cultivated in districts elevated from 2,000 to 5,000 ft. above the sea. It is valued for its stimulating narcotic properties, which it is said to possess in a greater degree than opium, to-

bacco, or any other vegetable production. The leaves are gathered and dried in the sun, and are chewed mixed with quicklime, which the Peruvians affirm renders its flavor sensible to the taste. As described by Pöppig (*Reise in Chile, Peru, &c.*, vol. ii., 1835), the practice of chewing the leaf is attended with the most pernicious consequences, producing an intoxication like that of opium. As the indulgence is repeated, the appetite for it increases, and the power of resistance diminishes, until at last death relieves the miserable victim. He describes the aroma exhaled from heaps of freshly dried leaves as so powerful in its effects, that persons unused to its properties suffer from severe headaches if they fall asleep near them. Prescott speaks of the coca as an article of so invigorating a nature that "with a small supply of it in his pouch, and a handful of roasted maize, the Peruvian Indian of our time performs his wearisome journeys, day after day, without fatigue, or at least without complaint." Under the Incas it is said to have been exclusively reserved for the noble orders. The statement of Mr. Whittall, R. N., made public by Dr. Thomson, in his "Cyclopædia of Chemistry," confirms the account of its giving wonderful powers of endurance, the Indians under its influence working 20 and 30 hours together without sleep. They travel on foot from La Paz to Sucre, 70 leagues, in three days, consuming little food, but chewing constantly the coca, carrying it in a small bag over their shoulder, together with a bottle of quicklime. The miners of this country, mostly Indians, are furnished with provisions by their employers, everything, excepting coca, in limited quantity; of this they are supplied with all they want. Some consume of it a pound a week, worth 6 reals (75 cents), or, if cultivated by the proprietors, about 4 reals. Its infusion has been used as a substitute for tea, enough for half a dozen people being made with four or five leaves. These are first treated before steeping with a little hot water, to draw off the acidity.

COCCEJUS, Johannes, a German Hebraist, whose real name was Cock or Koken, born at Bremen in 1603, died in Leyden, Nov. 4, 1669. At first professor of Hebrew at Bremen, then of Hebrew and theology at Franeker, he finally became professor of theology in Leyden, and wrote voluminous commentaries on the Bible, and numerous other works. He was the founder of a mystical sect who assumed the name of Cocceians.

COCCIA, Carlo, an Italian composer, born in Naples in 1789, died in Milan, May 12, 1873. He studied under eminent masters, became professor of music in Naples, and was connected as composer and director with theatres in Lisbon, London, and Turin. His productions include over 60 operas, more or less remarkable for exquisite melody. The most popular of them were *La festa della musica*, *Clotilda*, *La selvaggia*, *Fayel*, and *Maria Stuart*. He produced his last work in 1846.

COCCOLITHS AND COCCOSPHERES, names given, the former by Prof. Huxley, the latter by Dr. Wallich, to minute rounded bodies adherent to the gelatinous submarine protoplasm to which Prof. Huxley gave the name of *bathybius*. (See *BATHYBIUS*.) The latter are larger and more complex in structure than the former. The coc-



Coccoliths, magnified.

coliths he subdivides into discoliths and cyatholiths. He describes the discoliths as oval discoidal bodies with a thick, strongly refracting rim, and a thinner central portion, the greater part of which is occupied by a slightly opaque cloud patch, corresponding to the inner edge of the rim, from which it is separated by a transparent zone; in general, they are slightly convex on one side and correspondingly concave on the other, and the rim is raised on the more convex side; they are about $\frac{1}{8000}$ of an inch in their longest diameter. The cyatholiths are like minute shirt studs, varying in size from $\frac{1}{8000}$ to $\frac{1}{3000}$ of an inch. Coccospheres are described as of two types, one compact, the other loose in texture; the largest of the former type being about $\frac{1}{1300}$, and those of the loose type $\frac{1}{750}$ of an inch in diameter; they seem to be made up of bodies resembling cyatholiths; in fact, Dr. Wallich believes that the coccospheres are the parents of the coccoliths; both, without doubt, are the calcareous hard parts belonging to bathybius. These bodies have been found fossil in the chalk, showing the close resemblance of the conditions under which the chalk beds were formed to those existing at the bottom of the present Atlantic ocean.

COCCULUS, the fruit of a climbing plant, called by Linnæus *menispermum cocculus*, but



Cocculus Indicus.

now referred to a new genus, *anamirta*, imported from the East Indies. It is about the

size of a pea, and somewhat resembles the bayberry, having a dry, wrinkled exterior coat, within which is a shell enclosing a bitter, oily kernel. The bitter principle, called picrotoxine, is extracted by triturating the seeds with pure magnesia, and treating them with hot alcohol. To obtain it pure, it is again dissolved in alcohol, and treated with animal charcoal. After proper evaporation, it is deposited in crystalline form. In India, in Europe, and in the United States the *cocculus Indicus*, ground into a coarse powder, is used to intoxicate fish that they may be more easily caught. It is sometimes added to malt liquors, to increase their stupefying qualities. It is never given internally, but an ointment made from it is used in the East Indies as an outward application in obstinate cutaneous eruptions. A strong tincture of the fruit, rubbed upon the scalp of a child, has been known to produce fatal results.

COCHABAMBA (*cocha*, a lake, and *pampa*, a plain). I. A department of Bolivia, bounded by La Paz, Beni, Santa Cruz, Chuquisaca, and Oruro; area, 26,808 sq. m.; pop. about 380,000. It includes almost every climate, perpetual snows covering the mountains on its N. border, while the sugar cane and cacao grow to perfection in its rich valleys. Gold and other minerals exist, but mining receives little attention. The principal productions are cotton, sugar, dyewoods, and timber. It is divided into the provinces of Cochabamba, Sacaba, Tapacari, Arque, Ayopaya, Clissa, and Misque. The province of Cochabamba occupies a great plain at the foot of the snowy mountains, the passes leading to it being nearly 15,000 ft. high. This plain is cultivated throughout, and is very productive, the vegetation, which resembles that of the south of France, consisting wholly of imported species. II. A city, capital of the department and province, situated at the E. end of an extensive plain, 8,370 ft. above the sea, 122 m. N. N. W. of Sucre; lat. 17° 27' S., lon. 65° 46' W.; pop. about 40,000. It is built on both banks of the Rio de Rocha, which, as well as the Tamborada joining it just below, generally overflows in the rainy season, but is nearly dry during the rest of the year. The houses, mostly of but one story in height, are surrounded by gardens, and the city consequently covers much space. In the centre is a grand plaza, around which are four churches and the *cabildo* or government house, the latter a large plain building. There are in all 15 churches. The streets are broad and well kept, but the squares, used as market places, are generally littered with wares and goods and crowded with Indians. The prevailing language is the Quichua; good Spanish is spoken by persons of rank only. Cochabamba, situated in a comparatively isolated valley and devoted to agriculture, has not only escaped the decline which has overtaken most of the other Bolivian towns, but has continued to prosper and increase. It has considerable manufactures, particularly of

cotton cloths. Glass ware is made also to some extent. In 1579 Cochabamba, then recently founded, was named Oropesa by the viceroy of Lima, and the name is sometimes found in maps and documents, but is now unknown in Bolivia. The women of the place distinguished themselves by their daring and patriotism in 1815, during the war of independence.

COCHET, Jean Benoît Désiré, abbé, a French archæologist, born at Sanvie, near Havre, March 7, 1812, died in June, 1875. He studied at the college of Havre and at the seminary of Rouen, and became vicar at Havre and Dieppe, and subsequently almoner of the lyceum at Rouen. In 1842 he discovered at Étretat the remains of a Roman villa, and afterward made various explorations in the neighborhood of Dieppe, bringing to light many remarkable antiquities. Besides papers in several journals, he published *Eglises de l'arrondissement du Havre* (2 vols., 1844-'6); *Eglises de l'arrondissement de Dieppe* (2 vols., 1846-'50); *Étretat, son passé, son présent, son avenir* (1852); *La galerie dieppoise* and *La Normandie souterraine*, the latter work crowned by the institute (1854); *Sépultures gauloises, romaines, franques et normandes* (1857); *Eglises de l'arrondissement d'Yvetot* (2 vols., 1862); and *Répertoire archéologique du département de la Seine-Inférieure* (1872).

COCHIMI, a nation of Indians in Lower California, occupying the district between lat. 25° and 33° N., with some islands. According to their tradition, they were driven southward by other nations after a general war. The Cochimis, including the Laymones, were the most populous of the California tribes. They were darker in color than the Indians of Mexico, and well formed, but in the lowest degree of savage life, rising somewhat however above the other Lower Californians, being more intelligent and less brutal. The Jesuits began missions among them at San Ignacio in 1706, and maintained them till the suppression of the order, when they were continued for a time by the Dominicans. They were taught to cultivate the soil, and until the mission system was broken up by the Spanish government they were self-supporting and prosperous, but have since declined greatly.

COCHIN. I. A rajahship of India, near its S. extremity, on the Malabar coast, intersected by lat. 10° N., bounded N. by the district of Malabar, S. by Travancore, and W. by the Indian ocean; area, 1,988 sq. m.; pop. about 300,000. A considerable portion of the territory is under the presidency of Madras, and the remainder is governed by a rajah, under the protection of and tributary to the British. Magnificent forests of teak, ironwood, jackwood, and ebony cover the higher grounds, and are the source of most of the revenue of the country. The narrow valleys in the N. portion are well watered and fertile, yielding two crops of rice annually. There are several generally well

built and cleanly Christian villages, while near the town two classes of Jews, the Jerusalem or white Jews, and the ancient or black Jews, are numerous. **II.** A town, capital of the British district, and formerly of the rajahship, 168 m. N. N. W. of Cape Comorin, and 350 m. S. W. of Madras; pop. about 20,000. It is situated on a low sandy flat on the Malabar coast, and is nearly insulated by a backwater, extending S. to N. about 40 m. The harbor is obstructed by a bar, which prevents vessels of over 400 tons from entering at high tide. The port is also seriously affected by the S. W. monsoon for several months in the year, during which vessels can neither enter nor depart in safety. The town is a mile in length and half a mile in width, with streets crossing each other at right angles, and houses generally two stories high and covered with tiled roofs. The arsenal is the principal building. The fine cathedral built by the Portuguese was converted by the Dutch into a warehouse for the Dutch East India company. The suburbs Gulvaty and Mattuncherry extend half a mile S. E. along the edge of the backwater, and are inhabited by the white and black Jews, each class having a synagogue. Ship building, formerly the most important interest of the town, is still carried on to some extent, and timber, coconuts, coconut oil, coir, cordage, and cassia are the chief exports.—In 1503 the Portuguese were permitted to build a fort here. They established a Roman Catholic bishopric, which has long been vacant. The native Christians belong partly to the sect called the Christians of St. Thomas, and partly to the Roman Catholic communion; but they are described as grossly depraved and superstitious. The Dutch captured the town in 1663, made it the capital of their Indian settlements, and under their sway it became populous and thriving. The British took it in 1795, and in 1806 levelled the ramparts and blew up the fortifications and many of the public buildings, the explosion shattering nearly all the private dwellings of any size and value. Those of the Dutch who had means left the town, but most of them were reduced to beggary. A few Dutch families still reside there, and there is an old Dutch church in the N. W. part of the town, in which a Protestant minister officiates.

COCHIN, Charles Nicolas, a French engraver and designer, born in Paris in 1715, died April 29, 1790. He was hardly less eminent as a man of letters than as an artist, and published several volumes of travels and art criticisms. His engravings, numbering upward of 1,500, are executed with great taste and skill.

COCHIN, Pierre Suzanne Augustin, a French writer, born in Paris, Dec. 12, 1823, died at Versailles, March 15, 1872. He early took part in many philanthropic societies, and in 1850 became deputy to the mayor of the 10th arrondissement of Paris, and in 1853 mayor. Afterward he was a member of the municipal commission of the Seine. He was a strong

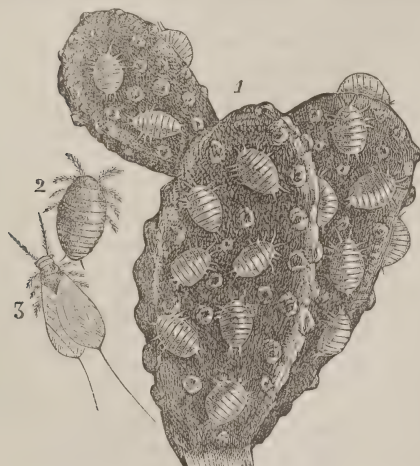
but unsuccessful candidate in the elections of 1863, 1869, 1870, and 1871. In 1871 he was one of the commission of inquiry as to the administration of Paris and the department of the Seine; and he was appointed by Thiers prefect of the department of Seine-et-Oise, but declined. He wrote upon social charity and political economy in the *Annales de la charité* and the *Correspondant*, of which he was from 1845 a leading editor. His *Essai* on Pestalozzi gained honorable mention in 1848 from the academy of moral and political sciences, to which he was elected in 1864; and his *Abolition de l'esclavage* (1861) received a prize of 3,000 francs from the French academy. Other important works are his *De la condition des ouvriers français* (1863), *Le monde invisible* (1864), and *La réforme sociale en France* (1865).

COCHIN CHINA. I. A province of the kingdom of Anam, occupying a narrow strip of its eastern coast, extending from about lat. $11^{\circ} 30'$ to $17^{\circ} 30'$ N. Its greatest length is a little more than 400 m.; greatest breadth not more than 70 m.; area, about 27,000 sq. m.; pop. estimated at 1,000,000. The general features of the country and its population are described in the article ANAM. This province formerly gave its name to the whole kingdom, but with the wider knowledge gained by Europeans of the Indo-Chinese peninsula, the more correct title of Anam superseded that of Cochin China, which is now, since the capture of Lower Cambodia by the French, almost exclusively applied to that region. The Anamese province is becoming better known under its native name of Dang-Trong. The principal town, Hué, is the capital of the whole kingdom. II. **French or Lower Cochin China**, a French colony in the southern part of the Indo-Chinese peninsula, bounded N. W. by Cambodia, N. E. by Anam, E., S., and S. W. by the China sea and the gulf of Siam; area, 21,724 sq. m.; pop. in 1868, 1,204,287. It consists of six provinces, Bienhoa, Saigon, Mytho, Vinhlong, Chandoc, and Hatien, the first three of which were ceded by Cambodia to France by the treaty of June 5, 1862, and the rest were declared French territory by the proclamation of Admiral de la Grandière, June 25, 1867. The physical features of the country, the character of its inhabitants, and the few known events of its history previous to the war which ended in French dominion, are described in the article CAMBODIA. Its more recent history is briefly as follows. After repeated instances of persecution on the part of the Anamese, who then ruled Cochin China, against the Christian missionaries, especially those of France and Spain resident in Lower Cambodia, and after repeated attempts on the part of the French to force upon the government the toleration of Christianity, a more serious conflict than had before occurred took place in 1847, originating in the attempt of Thien-tri, the king then reigning, to entrap and capture several French naval officers by treachery. Capt. Lapiere attacked

Turon with two ships of war and destroyed its fortifications, about 1,000 Anamese falling in the encounter. For several years after this an unfriendly state of affairs existed between the French and the king Tu-Duc, who scornfully refused in 1856 to make a treaty. This continued till 1857, when the murder of the Spanish bishop Diaz (July 20) was the signal for the outbreak of actual war. Admiral Rigault de Genouilly, with some aid from Spanish troops sent from Manila, again attacked Turon, took the peninsula of that name, penetrated early in 1859 into the interior of the country, by the river, and on Feb. 17 captured the port of Saigon. The French were preparing to push their conquests further, and Page, Rigault de Genouilly's successor, had already taken possession of several points near the coast, when the war in China called away their forces and determined them to hold only Saigon. It was not till February, 1861, that they were able to again begin operations on an extended scale. Admiral Charner then arrived with a large force from China, defeated the chief division of the Anamese army on Feb. 25, and within the next year was in possession of three important towns, Mytho, Bienhoa, and Vinhlong, and in a position to compel the submission of all lower Cochin China. Under the pressure of these circumstances, Tu-Duc found himself compelled to abandon a portion of his territory to save the rest, and on June 5, 1862, he made peace by a treaty in which he gave up the three provinces of Bienhoa, Saigon, and Mytho, and the island of Pulo Condore, to the French, promised tolerance toward the Christians, opened the Anamese ports of Turon, Balat, and Quangan, and bound himself to pay an indemnity of 20,000,000 francs. This treaty was concluded with Admiral Bonard, who had succeeded to the command of the French forces in August, 1861, and who was at once made governor of the colony. Vice Admiral de la Grandière succeeded him on May 1, 1863. On Aug. 11 of that year he concluded a treaty with the king of Cambodia, by which that country was placed under the protectorate of France, and by which the king gave up to the French the important river town of Namwang or Panomping, on the Mekong. In 1863 revolts against the French rule broke out in Gocong, south of Saigon, and in the spring of 1864 in Baria, and later in other parts of the country. Assuming that these disturbances were incited and promoted in the three provinces that still remained under the control of Anam, Admiral de la Grandière in 1867 declared it necessary to punish their inhabitants and government; and with this transparent cover for a scheme of further conquest, he took possession with a large force of these three provinces also, meeting with little or no resistance from the people.—The colonial government of Cochin China is now under the immediate control of the French ministry of marine, which appoints a governor of the

country, who is assisted by a council of which the commander of the French forces and an official corresponding to the American secretary of the interior are the chief members. The affairs of the provinces are managed by *inspecteurs des affaires indigènes*, under the last named officer; but with the local and municipal governments the French have interfered but little. The governor's residence is at Saigon, which has been greatly improved, and raised to a port and naval station of much importance.—See Aubaret's *Histoire de la Basse-Cochinchine* (Paris, 1867); Taillefer's *La Cochinchine, ce qu'elle est, ce qu'elle sera* (Périgueux, 1865); Lemire's *Cochinchine française et royaume de Cambodge* (Paris, 1869).

COCHINEAL (*coccus cacti*; Span. *cochinilla*), an insect used as a dye. Other species of the same genus of hemipterous insects, of the barklouse family, have been used from the remotest periods to afford the material of the brilliant



1. Cochineal Insects on branch of Cactus. 2. Female Insect.
3. Male Insect.

scarlet and crimson dyes of the ancient Hebrews, Egyptians, and the people of other eastern nations. The *coccus ilicis* is one of these, still found in the Levant, Greece, Palestine, Persia, &c., on a species of oak, in which countries it is employed as it was before the time of Moses. It has long been known by the name of kermes, which came from the Arabs, and signifies red dye. Beckmann conceives that the ancients obtained a finer color from these insects than from Tyrian purples, and its introduction among the Romans caused the use of the latter to be abandoned. The name cochineal, which Beckmann suggests is the diminutive of the Spaniards for *coccus*, is limited to that species which came to the notice of Europeans soon after the conquest of Mexico. The Spaniards found it in high estimation among the natives, who "took infinite pains to rear the insect on plantations of the cactus; and it formed one of the staple tributes to the crown from certain

districts." The Mexican *coccus* was soon introduced into Europe, where its superior quality was immediately appreciated. Even the live insects were imported, and plantations of cactus were cultivated for their nourishment. The French and Spanish kermes, which at that time was in high repute, disappeared and was soon entirely forgotten. In the family *coccidae* the insects have the form of oval or rounded scales, which cover the stems, branches, and sometimes the leaves of plants. The males, winged, pass through the usual changes, but the females increase only in size, always retaining the scale-like form.—The *coccus cacti* is a small insect with the body wrinkled transversely; its abdomen of a deep mulberry color, and bristly in the posterior part; the legs are short and black, the antennæ subulate and about one third the length of the body. The male has two erect wings, the female none. In Mexico they are reared chiefly in the state of Oajaca, those of the district of Mestique being considered the best insects. There are plantations of the nopal (*opuntia cochinillifera*) upon which they feed, the insects being tended with care equal to that ordinarily bestowed upon silkworms. Before the rainy season sets in, branches of the nopal covered with insects are cut off and brought under shelter to protect them from the weather. At the close of the wet season, about the middle of October, the plantations are stocked from these supplies by suspending little nests made of some soft woody fibre, each containing eight or ten females, upon the spines of the nopal. The insects, warmed by the sun, soon emerge and lay their eggs, each female producing more than 1,000 young. These spread rapidly over the plants, and as the young females become impregnated they attach themselves to the leaves and swell to great size, presenting the appearance more of vegetable excrescences than of animated creatures. In this condition they are gathered for the cochineal. The males, which are few in number, not more than one to 100 or 200 females, are of no value for this purpose. The females are picked off with a blunt knife, the first crop about the middle of December, and subsequently several more of as many successive generations, the last being in May. A laborer can pick off only about enough to make two ounces of cochineal in a day. Those taken off full of young lose about two thirds of their weight in the process of drying, to which they are subjected as soon as they are killed, which is done either by dipping them in a basket into boiling water, or placing them in a hot oven or on plates of hot iron. By the first method, usually considered the best, the insects turn to a brownish red color, losing a portion of the white powder with which they were previously loaded between the wrinkles of the body. In the oven they retain this, and their color is then gray. Those killed on hot iron turn black. Such is the origin of the different varieties known in our market as "silver grains" and

"black grains," and the "foxy" of the London market, the last being those killed by boiling water, though others ascribe it to the former being the female before laying her eggs, and the latter after she has parted from them. The quality of the cochineal is the same in both cases. When dried, the cochineal presents the form of grains, convex on one side and concave on the other, about one eighth of an inch in diameter, with the transverse wrinkles still visible. It is stated that it takes about 70,000 insects to weigh a pound. In 1866 England imported 32,757 cwt., valued at £594,818, and exported 21,238 cwt., the annual consumption being about 12,000 cwt.; the price in 1870 was about 3s. per pound, a little more than half its former rate. In 1871 the imports into the United States were 1,849,842 lbs., valued at \$1,184,255; of which 800,995 lbs. were from England, 736,573 lbs. from the United States of Colombia, 184,615 lbs. from Mexico, 100,675 lbs. from the West Indies, and 26,989 lbs. from other countries. An inferior quality of cochineal, called *sylvester*, is collected from a wild species of cactus, though the insect is sometimes cultivated with the others. Cochineal insects are attacked and fed upon by birds, mice, and the larvæ of other insects; the last named suck out their bodies, leaving only the skin.—Attempts have been made with some success to introduce the culture of cochineal into other countries. The English government at one time offered £6,000 to any one who would introduce it into India. The Spaniards, however, for a long time took every precaution to prevent the removal of the living insects from the country. They were introduced into the Canary islands about 1830, and after the failure of the grape in 1850 became the principal article of export. In 1856 the exports were about 1,500,000 lbs.; in 1870, 6,000,000 lbs., valued on the spot at \$3,200,000, most of which was sent directly to England. The French had succeeded in 1844 in establishing cochineal plantations in Algeria, and specimens have been produced from that country said to be superior to the best Mexican. The Dutch have also succeeded in producing large quantities of genuine cochineal in Java. A variety found in California has all the properties of the cochineal of Brazil and the southern part of Mexico, the only apparent difference being that the article found in California is a light pink, while that of other regions is a deep scarlet.—The coloring principle which causes cochineal to give a crimson color to its watery infusion has been separated by Dr. John, who gave it the name of cochiline. It is a brilliant purple red color, very soluble in water and in alcohol, but insoluble in ether, obtained by macerating cochineal in ether, and treating the residue with alcohol, and evaporating. It is next to be purified from fatty matters which accompany it by dissolving again in alcohol, and adding a little sulphuric acid, which causes it to be precipitated in a few days. The coloring matter is thrown

down by different metallic salts, as those of zinc, bismuth, iron, nickel, tin, &c., and thus produces precipitates of various brilliant colors. By means of the chloride and nitrate of tin the bases of the splendid crimson and scarlet dyes are obtained, to which the great value of cochineal is chiefly owing. (See CARMINE.) The best of the pigments called lakes are made by introducing freshly prepared gelatinous alumina into the decoction of cochineal.—The high price of cochineal has led to the substitution of other articles in dyeing, and lac and madder have superseded its employment to a great extent. Various articles are used in the adulteration of this substance. Powdered talc or carbonate of lead shaken in a bag with the insects adheres to their bodies, and increases their weight. Grains of a substance manufactured from colored dough have been prepared in France to imitate the dried insect.

COCHITUATE LAKE, a small sheet of water in the towns of Wayland, Framingham, and Natick, Middlesex co., Mass., 17 m. W. by S. of Boston, which is supplied from it with water. It covers 650 acres.

COCHRANE, Lord. See DUNDONALD, earl of.

COCHRANE, John Dundas, a British traveller, nephew of Archibald, ninth earl of Dundonald, born about 1780, died in South America, Aug. 12, 1825. He entered the British navy at the age of 10, and rose to the rank of captain. In 1815 he commenced a series of journeys on foot through France, Spain, and Portugal. In 1820 he submitted to the British admiralty a plan for exploring the interior of Africa and the course of the Niger, which was declined. Cochrane then resolved on making a tour of the globe, as much as possible on foot, his means not allowing him to travel otherwise, intending to cross from Asia into America at Behring's strait. He started from London in February, 1820, reached St. Petersburg April 30, and left that place May 23, the Russian government affording him various facilities. Before reaching Novgorod he was attacked by robbers and plundered of everything, even his clothing. The governor of Novgorod reimbursed him for these losses. He visited Moscow and Kazan, crossed the Ural mountains, halted for a time at Tobolsk, and ascended the Irtysh as far as Semipalatinsk. Thence he turned his steps to Tomsk, and afterward to Irkutsk; there embarking on the Lena, he reached Yakutsk Oct. 6, 1820. From this place he struck out north, continuing his journey on a sledge drawn by dogs; the thermometer often descended as low as -29° F., and on Dec. 31, the day that he arrived at Nizhni Kolymsk, it went down to -62.5° . The Tchukthi would not allow him to traverse their country on his way to Behring's strait, and he took a S. E. direction, reaching Okhotsk June 23, 1821, after suffering intensely from cold and hunger. For 400 m. he had not met a single human being. On Aug. 24 he set out for Kamchatka, and on arriving at

Petrovavlovsk was well received by the Russian functionaries. There he became enamored of the daughter of the sexton of the town, married her, and abandoned the intention of walking across the North American continent. He returned to London by the same route which he had previously travelled, and reached Britain after an absence of three years and two months, and published "Narrative of a Pedestrian Journey through Russia and Siberian Tartary, from the Frontiers of China to the Frozen Sea and Kamtchatka" (2 vols., London, 1824). His propensity to wander did not allow him to remain quiet long, and he next proceeded to South America, where he died engaged in some mining enterprises.

COCHUT, André, a French publicist, born in Paris in 1812. He early acquired distinction as a political economist and as an authority on Algerian colonization, by his disquisitions in the *Revue des Deux Mondes*, and in 1848 by his *Rapport général sur l'Algérie*, drawn up and printed by order of the government, though the publication was prevented by the outbreak of the revolution. In 1851 he published a volume containing a number of his contributions to the press, especially to the *National*, under the title of *Les associations ouvrières*, &c. His principal subsequent essays are a historical sketch of the system of Law (in the *Bibliothèque des chemins de fer*, 1853), and *Opérations et tendances financières du second empire* (in the *Revue des Deux Mondes*, 1868).

COCK (Lat. *gallus*), a gallinaceous or rasorial bird of the order *gallinæ* and family *phasianidæ*, originally a native of Asia. The birds of this genus, which includes the numerous varieties of domestic poultry, are distinguished from the pheasants by the crown of the head being naked, and the skin raised into a fleshy comb; by the base of the lower jaw having fleshy lobes or wattles; and by the tail, composed of two planes of feathers folded at a sharp angle, being generally carried erect. In the males the central tail feathers are elongated, and fall gracefully over the rest; the feathers of the neck, lower back, and tail coverts are very full, and assume various shapes. They inhabit the jungles of India and the Asiatic islands; they are polygamous, and the males are exceedingly pugnacious, manifesting their joy when victorious by loud and piercing notes; the males have a brilliant plumage, but the females, or hens, are of a duller color and smaller size. Of the many native species now known, it is difficult to decide from which, if from any, the domesticated races have sprung. It is the prevailing opinion that many species have mixed to produce the common barnyard fowls. Temminck, who has paid the most attention to this subject, gives the preference to the species *G. giganteus* and *G. Bankiva*, from the fact that the females of these resemble in form and structure of the feathers our domestic hens, and that the males resemble

the dunghill cock in the great development of comb and wattles. The Jago and the Javan cock are probably the principal wild originals of the domestic breeds; and it is universally admitted that Asia was the primitive seat of the genus, and there also now exist the above mentioned wild species. The Jago cock (*G. giganteus*, Temm.), of large size, is a native of Sumatra and Java; the comb is thick, slightly raised, and truncated or rounded at the top; the throat is bare, and the wattles of moderate size; the head, neck, and upper back are covered with pale golden-reddish hackles; the middle of the back and lesser wing coverts are deep chestnut, the feathers with disunited webs, the hackles covering the rump and base of the tail reddish yellow; tail large, and, with the greater wing coverts, glossy green; secondaries and quills with the outer webs pale reddish yellow; under parts glossy blackish green, with the base of the feathers deep chestnut, occasionally mottling the under plumage. The height of the cocks is from 2 to 2½ ft. To this species must probably be referred the large varieties so well known under the names of Chittagongs, Shanghai, Cochinchina, and Brahmapootras. The Javan cock (*G. Bankiva*, Temm.), the type of many of the smaller varieties, and especially resembling many bantams, occurs wild in Java and Sumatra. The skin is bare around the eyes and throat, the comb is large and deeply serrated, and the wattles well developed; the head, back, sides of the neck, and rump are covered with long golden hackles; the upper back is bluish black, the centre of the lesser wing coverts of a deep chestnut, with the webs of the feathers disunited; the greater coverts steel-blue, the secondaries the same, margined with chestnut; the quills brownish black, edged with reddish yellow; the tail black, with metallic reflections; the under parts black. Other wild species, less resembling the domestic fowls, but readily crossing with them, are the following: The bronzed cock (*G. aneus*, Cuv.), also from Sumatra, larger than the Javan; the comb is very large, and not serrated; the wattles are small and thick, and with the bare cheeks and throat are bright red; the feathers are not hackled, of a metallic green, with brilliant reflections; the plumes are rich purple, with a broad pale lake border; the tail is purple, with green reflections; under parts deep black, shaded with purple and green. The fork-tailed cock (*G. furcatus*, Temm.), a native of Java, a large species, is remarkable for its horizontal and forked tail, its smooth comb, and a large single wattle springing from the centre of the throat and divided into several lobes; the feathers of the head, neck, and upper back are short and rounded, close, velvety, and scale-like; the color of the centre is a deep metallic blue shading into golden green, with a narrow border of deep black; on the lower back and tail coverts the feathers are

lengthened, black in the centre, with a narrow edge of yellow; the wing coverts are bordered with orange-red; the under parts are deep black; the hanging tail feathers are metallic green, tinged with steel-blue; the bill, legs, and feet are yellow; the female has much brown in the plumage, and the under parts gray. This species inhabits thick woods, and is very wild; though rarely domesticated, the males cross readily with domestic hens, and in this way add a puzzling element to the problem of the origin of the common races. Sonnerat's wild cock (*G. Sonneratii*, Temm.) inhabits the high wooded districts of Hindostan, where it is called by the English sportsmen jungle fowl. It is nearly as large as the domestic fowl, though of more slender proportions; the comb is large and serrated, and the wattles double; the shafts of the hackled feathers, of a golden orange color, in the centre and at the tip are developed into flat horny plates, similar to those of the wings and tail of the Bohemian



Sonnerat's Jungle Fowl (*Gallus Sonneratii*).

wax-wing; the centre of the back, the throat, breast, belly, and thighs are deep gray; the tail a rich green; below the hackles the feathers are deep purple with a pale yellow edge, and below these golden green, edged with gray with brilliant metallic reflections. The hen has neither comb nor wattles, and the neck is covered with feathers; the plumage is of a general brown tint above, and grayish white below. Though smaller than game cocks generally, it is very bold and active, and is eagerly sought after by the Mohammedan natives of India for cock-fighting; it is generally believed that this species has not mixed with the domestic races, except in the breeds kept as game cocks. The negro cock (*G. morio*, Linn.), originally from India, is remarkable for its blackish violet crest and wattles, black skin and periosteum; the plumage is of a dark color, with bronzed reflections; this easily becomes domesticated, and crosses readily with other races. The crisped

or Friesland cock (*G. crispus*, Linn.), considered a distinct species by Temminck and Gray, has the ends of the feathers turned up or frizzled; it is of small size, wild, not very easily domesticated, and is seldom reared except for curiosity; the pure breed is white, with smooth feet. They are quite common in Java, Sumatra, and the Indian archipelago, where the natives rear them. Some authors consider this and the next species mere varieties produced by accident, and perpetuated by accident or design. The silk cock (*G. lanatus*, Linn.) has the webs of the feathers so disunited that they appear like silk or glossy hairs; the general color is white, and the legs are feathered externally to the toes. It is common in China and Japan, where specimens are sold to Europeans as curiosities. The epidermis is black, and this peculiarity is communicated to the hybrids produced by them and the common fowl, with which they readily cross; the flesh, however, as in the negro fowl, is white and of excellent flavor. The gallinaceous birds are remarkable for the facility with which different species will unite and produce fertile offspring, a peculiarity which renders them doubly valuable to man. The wild hens do not vary in their plumage like the domestic, but resemble each other individually, being generally of colors intermediate between black and white, these two colors being the result of special care on the part of man to keep breeds unmixed. There are species, however, which must originally have been white, as the *G. crispus* and *G. lanatus*, and such breeds will remain white if not crossed with others.—It would be useless to enter into any description of the external appearance of the common cock and hen; but there are some points of internal structure which may be mentioned. Toward the lower part of the neck the œsophagus is dilated into a first digestive cavity with membranous walls, the crop, in which the food remains a certain time and undergoes a partial softening; below this is a second digestive cavity, small in the *gallina*, but large in birds having no crop, and secreting a gastric juice; this opens into the third stomach, or gizzard, where chymification is completed; the gizzard is remarkably muscular, and able to comminute the hardest food, and even foreign bodies exposed to its continued action; to assist in breaking up the hard grain and seeds on which they feed, the *gallina* are in the habit of swallowing small pebbles. The intestinal canal is long, as in vegetable feeders generally, measuring five times the length of the bird; the cæca are six inches long; the testes are probably larger in proportion to the size of the body than in any other bird; the trachea and larynx are capable of being elongated, compressed, or dilated, according to the sounds to be produced. The cock is a proud bird, walking as if conscious of his superior strength; but at the same time he is kind, always inviting his family to eat first of any food he may have

discovered, and protecting them from the attacks of all enemies. Now and then a hen essays to crow, but she is generally a barren and useless fowl, despised by her associates and the pest of the farm yard. The cock is very pugnacious, and will always measure his strength with one of his own sex; this propensity is noticed in very young specimens. The male begins to propagate at about the age of three months, and his vigor lasts about three years, though he may live to the age of ten; one is sufficient for 15 or 20 females. The cock is a very clean bird, and spends much of his time in arranging his feathers; his voice, if not soft and melodious, is clear, sonorous, and exhilarating. The cock was a favorite bird with the Greeks and Romans, and is frequently represented on their coins; the ancient philosophers dedicated it to Apollo, Mercury, Mars, and Æsculapius, and thought it the most acceptable sacrifice they could offer to their deities; in later times, the crowing of the cock was supposed to be the signal at which all spirits, whether good or evil, must retire from mortal sight. Like other domesticated races, cocks and hens are very liable to monstrosity; double-headed and four-footed chickens are common in collections. Hens, if properly housed, will lay even in the coldest weather in temperate regions; having laid 18 or 20 eggs, they show a disposition to sit upon them, but if the eggs are taken away they continue laying. As the *gallinæ* can eat without assistance as soon as they leave the egg, instinct teaches the hen to lay as many eggs as she can cover and keep warm with her body. Like all birds, the hen, if left free to act, will lay her eggs and hatch her brood in some hidden place, and return to the poultry yard with her chickens in excellent condition. The young leave the egg on the 20th day. The affection of the hen for her young is remarkable; as the cock is a model husband and father, the hen is the pattern of a tender and faithful mother.—For epicurean purposes, man has from ancient times been in the habit of removing the testes of the cock; this mutilation renders the birds, called capons, indifferent to sexual and fighting propensities, and causes them to grow fat, with all the whiteness, tenderness, and delicacy of a chicken; the voice loses its shrillness, and their whole demeanor renders them liable to the insult of both cocks and hens, and they require special protection that they may eat, drink, sleep, and grow fat. Capons may be taught to perform some of the offices of the female; they have been taught to hatch out eggs by covering them with their bodies, and to take the care of the young brood. Hens are sometimes deprived of their ovaries, and the flavor of their flesh is said to be thereby much improved.—Various artificial processes of incubation have been tried; the ancient Egyptians were peculiarly successful in their processes, and their hatching ovens furnished in old times 100 millions of chickens annually; other nations,

the French particularly, have invented various kinds of hatching apparatus. By the Egyptian process more than two thirds of the eggs produced chickens, while the hen, upon an average, cannot hatch more than half of the eggs.—Domestication has produced many changes in the form and size of the cock, especially in the crest, wattles, and arrangement of the feathers on the body and legs. The game cock stands at the head of the domestic varieties, from which it does not appear to differ except in its superior strength and courage; the best breed is generally believed to be the *G. Bankiva* without any crossing with other varieties; the East Indians prize the *G. giganteus* and the *G. Sonneratii* as game cocks. Cock fighting was practised among the Greeks and Romans, and was introduced into England by the latter nation, and it is a favorite sport in the East Indies and in Spanish America. In this sport the plumage is trimmed, to make the bird lighter and more active and give its antagonist less hold upon

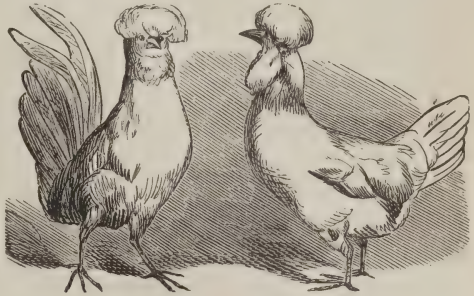


Game Cock.

it; the legs are armed with an artificial steel spur, called a gaff or gaffe, capable of inflicting a speedily fatal wound. When cock fighting was the favorite sport of kings and nobles, as much attention was paid to keeping the breed pure as was bestowed upon the race horse. The game cock is valuable, independently of his courage; the hens are small eaters, good layers, determined sitters, strong, rarely sick, and very solid and heavy.—Preëminent among the modern favorites are the large Malay and Chinese varieties, embracing the Chittagongs, Shanghai, Cochín Chinas, and Brahmapootras, which are probably all varieties of the *G. giganteus*, variously crossed. The Chittagongs were originally brought from Malacca; they stand high on their legs, are long-necked, and are usually dark brown, streaked with yellow or white; they present a very striking appearance, and form an excellent cross with the common fowl, possessing the hardiness of the latter with the large size of the foreign stock. The Shanghai variety weigh as much when

five months old as the full-grown common kind; they may be black, yellowish, or white, bare-legged or feathered, and all equally good. The pure variety is large, with a round short body, broad breast and back, and closely feathered; when a year old, the male should weigh from 10 to 12 lbs., and the female from 8 to 9 lbs. They are little disposed to roam or do mischief in the garden; they are good layers, and their flesh is yellow, juicy, and of delicate flavor. The Cochin Chinas, considered by many the same as the Shanghai, are very large; the general color is a rich glossy brown or deep bay, with a black horse-shoe marking on the breast; the comb is moderate, serrated, and the wattles double. From their ability to double up the posterior half of the wing and to bring it forward between the body and the anterior half, they are sometimes called ostrich fowl. The flesh is white and delicate; the eggs are large, chocolate-colored, and of excellent flavor; and they are good layers. The Chinese fowls were imported from Canton about 25 years ago, and somewhat resemble the Cochin Chinas in size and color; they are good layers; the eggs are buff or nankeen color, and the flesh is good; they are hardy, peaceable, and easily raised; their wings are so short that they cannot fly over ordinary fences, and it is necessary that their perches should not be more than two feet from the ground, nor above each other. The Brahmapiootras are either a gray variety of the Shanghai or a cross between the latter and the Chittagong; they are excellent layers, and their eggs are twice the size of a common hen's egg; a pair will weigh from 18 to 24 lbs.; crossed with the Dorking breed, it is very handsome. The Dorking breed, so called from the English

ber of toes has been found, a peculiarity which by great care might become the characteristic of a breed. The color originally was pure white, but they are now generally seen speckled or mottled with black or gray. The flesh is white and delicate; they are good layers, and easily reared and fattened. This breed is supposed by Dickson to have originated from a cross of the Malay with the game fowl. The males weigh from 7 to 9 lbs., the females from 5 to 7 lbs.; when bred in and in for a long time, the comb becomes double. The black Poland, instead of a comb, has the head covered with feathers, which sometimes form a crest overhanging the eyes; there are also white, silver, or golden Polands, according to the general color; the first named is black, with a white topknot; all varieties with top-knots are called Polands by the English. They are very ornamental, and excellent layers, but so little inclined to sit that their eggs are often put under other hens; they fatten quickly, and their flesh is considered by many as equal to



Poland Chickens.



Dorking Cock.

that of the Dorkings. This breed is said to have been carried to Europe by the Spaniards from Santiago. The black Spanish fowl is a large breed, with high-colored comb and wattles, doubtless the result of high culture; the general color is black, and the feathers of the legs, thighs, and belly are velvety; the feet and legs are lead-colored; the distinguishing character is the silvery white cheek pieces; they are excellent for the table, and layers of the first order, and cross advantageously with the common fowl; from their wildness they are good for ranging over large farms; the male weighs from 4 to 6 lbs., the female from 3 to 4 lbs. The Fayal fowls are the same. The Bolton grays have the plumage silvery white, with minute and uniform pencillings of black; their forms are small, neat, and rounded, the comb double-rowed and sharp-pointed, the wattles large and round, and the ear lobes white; they are good layers, easily kept, hardy, and moderate eaters; they are also called Hamburgs, of which there are the varieties, creole, silver and gold spangled, and pencilled Hamburgs. The small race of bantams, so named from a town in Java, are distinguished by their plumed legs, a variation

town of Dorking in Surrey, are of large size and good shape, and if pure should have two toes behind instead of one; the silk fowl also is seen with five toes, and even a greater num-

caused by cultivation and high feeding; some have topknots, others have the legs naked; there is a dwarf variety, not larger than a pigeon; the Turkish cock seems to differ from the bantam only in the naked legs. Many extensive breeders are of opinion that the native yellow-legged fowl is as profitable as any foreign breed; of course they vary much, according to the mixture of varieties; they ought to lay from 150 to 250 eggs in a year, but probably, as generally kept, they do not average more than 30, and their average weight would not exceed $2\frac{1}{2}$ lbs.

COCKATOO, a name given to the parrots of the subfamily *cacatuinae*, family *psittacidae*, from their peculiar call note or cry. The cockatoos have the bill large, of various lengths, broad at the base, with the culmen usually much arched to the tip, which is very acute; the wings generally rather long and pointed, the tail broad and mostly even, the tarsi short and robust and covered with small scales, and the toes unequal. They may be readily distinguished from the other parrots by their light color, and their graduated crest and even tail; some of the genera, however, have sombre colors, but none the gorgeous hues of the lories, macaws, and parrakeets. Their robust legs and strong claws indicate the rasorial or scratching propensities of the group; and their powerful bills are able to break the stones of the hardest fruits. They are rather wild, and possess but little imitative power, seldom articulating anything more than "cockatoo."—The genus *cacatua* (Briss.), from which the subfamily is named, has the bill short and strong, hooked and acute; the wings long, and the tail short and even. About a dozen species are found in the forests of the Moluccas and Australia, some preferring high trees near rivers and swamps, others the open plains; they are shy and hard to approach, though their presence is easily known from a distance by the loud screams from their vast flocks; they feed on vegetable substances, seeds, nuts, tubers, and bulbous roots, which they dig up with their strong claws; they do much injury to trees by stripping off the bark of the smaller branches, cutting it into small pieces, but not using it for food; the eggs, usually two in number, are laid in the rotten portions of holes in trees, or in fissures of the rocks. This genus embraces some of the most beautiful species, of large size, of a white plumage tinged with rose color or sulphur yellow, and with large crests. Among the finest is the tricolor-crested cockatoo (*C. Leadbeateri*, Vigors), with a crest of scarlet, yellow, and white, of long acuminate feathers, with the tips directed forward, which the bird can open and shut like a fan; it is a native of Australia; the whole of the body is white, tinged with crimson on the neck, breast, sides, and under the tail and wings. The sulphur-crested cockatoo (*C. sulphurea*, Gmel.) resembles the last named, except that pale sulphur yellow takes the place of the red-

dish tints; it is a native of the Moluccas and other Indian islands; from its beauty, docility, and amusing habits, it is a favorite with bird fanciers. Other species living in the Moluccas



Tricolor-crested Cockatoo (*Cacatua Leadbeateri*).

are the *C. rosei-capilla* (Vieill.), *C. Moluccensis* (Gmel.), and *C. cristata* (Linn.); the red-crested cockatoo, *C. Philippinarum* (Gmel.), a native of the Philippine islands, is also a handsome species.—The genus *licmetis* (Wagler) differs from *cacatua* in having a bill much longer; it is peculiar to Australia, living in flocks on trees in the neighborhood of water; the food consists of bulbous roots, which they dig up from considerable depths in the earth; the notes are rather plaintive. Another genus peculiar to Australia is *calyptorhynchus* (Vig. and Horsf.), characterized by a very large and strong bill, broad at the base, and much higher than long; the lower mandible small, dilated, and strongly emarginated at the tip; the wings moderate, and the tail lengthened and rounded. They live in small flocks in woods near rivers, feeding on the fruit and bark of the *eucalyptus*, destroying more than they eat by cutting



Banksian Cockatoo (*Calyptorhynchus stellata*).

off the smaller branches and unripe fruit; their flight is heavy and noisy; they are very shy, and more fierce and wild than other parrots; the eggs, two or three in number, are

laid in the hollows of decayed trees. There are about a dozen species, of large size, and of dark colors. One of the finest species is the Banksian cockatoo (*C. stellata*, Wagler), called by the natives *geringore*; the plumage is generally greenish black, with a purple tinge on the back and wings; the bill is grayish white, the cheeks yellow, and the lateral feathers of the black tail vermillion in their central portion



Goliath or Great Black Cockatoo (*Microglossum aterrimum*).

with narrow bars of black. A larger species is Solander's cockatoo (*C. Temminckii*, Kuhl).—One of the largest of the parrot family is the Goliath, or great black cockatoo, belonging to the genus *microglossum* of Geoffroy, which is characterized by a very large bill, much curved to the long and acute tip, the lateral margins of the upper mandible bidentated, the lower mandible smaller, broad, and much emarginated on each side; the cheeks and front of the



Long-billed Cockatoo (*Nestor productus*).

throat denuded of feathers; they live in the forests of Papua, Ceram, and other eastern islands. This species (*M. aterrimum*, Gmel.) is of dark color, with a crest of grayish, long narrow feathers, which can be erected at will. The genus *nestor* of Wagler has the bill much lengthened, the wings long and pointed, and the tail moderate and even, with the shafts of the firm broad feathers pro-

longed beyond the webs. There are two species, living in New Zealand and Australia; they eat nuts, berries, and bulbous roots; in the morning and evening they are very noisy. The southern brown cockatoo (*N. australis*, Shaw) has the forehead and crown grayish white, slightly tinged with green; the ear coverts yellowish; the sides of the neck, breast, and abdomen dull red, the feathers margined with green; the back and wings brownish oil-green; the rump and vent deep red; the tail brownish green.

COCKATRICE, generally identified with the basilisk, a fabulous, serpent-like animal, which was believed to be produced from a hen's egg. The superstition prevailed among the ancients and during the middle ages. (See **BASILISK**.)

COCKBURN, Sir Alexander James Edmund, an English jurist, born in 1802. His father, Alexander Cockburn, was British minister in Colombia; his mother was a daughter of Viscount de Viguier of Santo Domingo; and he succeeded to the baronetcy on the death of his uncle, Sir William Cockburn, dean of York, in 1858. He graduated at Cambridge, was called to the bar in 1829, and went the western circuit. He was made a queen's counsel in 1841, and obtained a large share of the parliamentary practice that grew out of the railway mania of 1846. In 1847 he was returned to the house of commons from Southampton, and distinguished himself especially in 1850, when he made his celebrated defence of Lord Palmerston's foreign policy. In August, 1850, he was appointed solicitor general and knighted, and in March, 1851, attorney general, which office he held (with an interval from February to December, 1852) till November, 1856. In 1854 he was made recorder of Bristol, having previously been recorder of Southampton. He was a member of parliament for Southampton till November, 1856, when, on the death of Chief Justice Jervis, he was created chief justice of the court of common pleas, and in 1859 became chief justice of the court of queen's bench, succeeding Lord Campbell, who was made lord chancellor. His charge to the grand jury, April 10, 1867, in the case of Gen. Nelson and Lieut. Brand, prosecuted by the Jamaica defence committee, contains an elaborate exposition of martial law, and of its application in various periods of English history. In September, 1871, he was appointed the British arbitrator under the treaty of Washington for the settlement of the Alabama claims. Differing with his colleagues at the Geneva conference, he refused to sign the award that was finally made in favor of the United States, and prepared an elaborate dissenting opinion. His course at the conference has been the subject of much criticism, especially on the part of the Hon. Caleb Cushing in his "Treaty of Washington" (1873). This work analyzes his character and manners with great severity, but does not refer to his domestic relations, which have been often com-

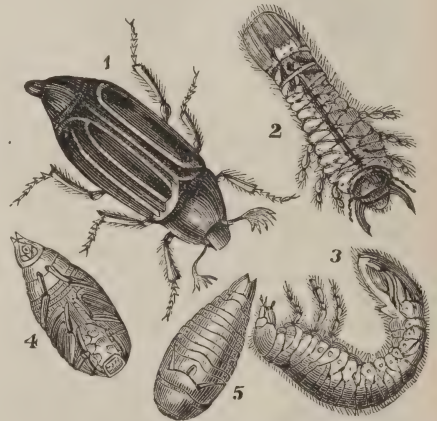
mented upon in England, particularly at the time when, relying upon his official distinction and influence, he insisted upon introducing his daughter, one of his numerous illegitimate children, into society in London. At the conclusion of the arbitration of Geneva it was proposed that he should be raised to the rank of baron; but the queen refused on account of his irregular domestic life, and he received only the grand cross of the order of the bath (1873).

COCKBURN, Catharine, an English authoress, born in London, Aug. 16, 1679, died May 11, 1749. She was the daughter of Capt. David Trotter, was converted from the Protestant to the Roman Catholic faith, and then reconverted, and in 1708 married Mr. Cockburn, a non-juring clergyman, who afterward took the oaths, and obtained the living of Long Horseley, Cumberland. She wrote "A Defence of Locke's Essay on the Human Understanding," and various essays, tragedies, comedies, and poems. Her works were published by Dr. Birch (2 vols., 1751).

COCKBURN, Sir George, an English admiral, born April 22, 1772, died Aug. 19, 1853. He served on the East India, home, and Mediterranean stations, and received the thanks of the house of commons for his operations against Martinique, by which that island came into the possession of Great Britain. He took a conspicuous part in the hostilities against the United States, particularly in the burning of the capitol and other public buildings at Washington in 1814, and in laying waste the banks of the Potomac and Chesapeake. Upon the close of the war he was employed to convey Napoleon to St. Helena. After his return to England he served repeatedly as member of the house of commons and as lord of the admiralty.

COCKBURN, Henry Thomas, lord, a Scottish jurist, born near Edinburgh, Oct. 26, 1779, died April 26, 1854. In 1800 he entered the faculty of advocates, and attached himself to the whig party, although his family connections belonged to the tories. His politics interfered with success in his profession, but in course of time he rose to eminence as an advocate. He brought himself into notice in 1818 by gratuitously defending several persons charged with treason. In 1828 he defended Helen McDougal, charged as an accomplice with Burke in the "Westport murders," and obtained her acquittal. Under the administration of Earl Grey, Jeffrey became attorney general and Cockburn solicitor general for Scotland. In 1834 he was raised to the bench as one of the lords of session, when he took the title of Lord Cockburn. Three years afterward he was appointed a lord commissioner of justiciary. He was an early contributor to the "Edinburgh Review," an article in which from his pen went far to produce a reform in the method of selecting juries. His literary fame rests on his "Life and Correspondence of Lord Jeffrey" (2 vols., 1852), and his posthumous "Memorials of his Times" (1856).

COCKCHAFFER (*melolontha vulgaris*, Fab.), a European insect, belonging to the lamellicorn family of the order *coleoptera* or beetles. The genus *melolontha* was established by Fabricius, who first separated it from *scarabæus*. The body of the melolonthians is oblong oval, convex, and usually of a brownish color; the antennæ have nine or ten joints, five to seven of which are flattened into leaf-like pieces, which open like the leaves of a book; the jaws are horny and powerful for cutting and grinding the leaves and roots of plants; the thorax is nearly square; the wing cases leave uncovered the hinder extremity of the body; the legs are long, the first pair being armed externally with two or three teeth, which enables them readily to penetrate the ground; the claws of all are notched, which gives them a firm hold of the leaves. The habits and transformations of this species are well known, and will serve as a type for all the *melolonthidæ*, which are all more or less hurtful to vegetation, as they feed



1. Cockchafer (*Melolontha vulgaris*). 2. Larva, back view. 3. Larva, side view. 4. Pupa, under side. 5. Pupa, upper side.

on plants from their birth to their death. Their duration in the perfect state is very short, each individual living about a week, and the species wholly disappearing in the course of a month. After the pairing of the sexes, the males perish, and the females dig a hole in the earth six inches deep, by means of their fore feet, in which the eggs are deposited to the number of 100 to 200; after this they return to the surface, and soon die. In two weeks little whitish grubs are hatched from these eggs, with six legs near the head, and strong jaws, which attach themselves to the tender roots, and commit often the most deplorable ravages; for three or four summers the larvæ live near the surface, sinking below the reach of frost as winter approaches, and remaining torpid till spring, when they change their skin, and ascend to the surface for food. When they have reached their full growth, they cease eating, and bury themselves about two feet deep, each

constructing a kind of lodge, smoothly lined by some glutinous silky substance thrown from the mouth; in this it is changed into a pupa or nymph, casting off its skin, displaying through the new envelope the parts of the perfect insect. In the month of February the cockchafer pierces this envelope, and three months afterward makes its appearance during the night in its final form. The ravages committed by these larvæ are often as extensive as those of the locust tribe. According to Kirby and Spence, they destroy whole acres of grass by devouring the roots, undermine the richest meadows, and eat the roots of wheat and other grains, and those of young trees; in England, Ireland, and France whole crops have been repeatedly destroyed by them. They are equally destructive in their perfect state. During the month of May they come forth from the ground, whence they have been called May bugs and May beetles. They are sometimes called also dor bugs. They pass the greater part of the day in a quiet state, attached to the branches and leaves of trees; as evening



Cockchafer.

approaches, they become active, buzzing about from tree to tree in search of food, and for the purpose of pairing. Their flight is dull, heavy, and irregular; they fall against objects in their way with a force which often brings them to the ground; they continue their flight till about midnight, and they frequently fly in at the window, being attracted and bewildered by the light of a lamp. In the "Philosophical Transactions" for 1697, it is stated that a few years before they were so numerous in Galway, Ireland, that they filled the hedges and trees, clinging to each other like swarms of bees, and when flying darkening the air like a cloud; in a short time all the foliage for miles around was consumed, and the trees in midsummer were as bare as in winter. Mouffet, in his "History of Insects," says that in 1574 so many cockchafers were driven into the river Severn that the wheels of the mills were stopped. To check these ravages many methods have been employed, but nature has provided better means in the numerous animals and birds which feed upon them.—In America there are several melolonthians, whose ravages are nearly as great as those of the European

cockchafer. The most common is the May beetle (*phyllophaga quercina*, Knoch). This is of a chestnut-brown color, smooth, and finely covered with little impressed dots; each wing case has two or three slightly elevated longitudinal lines; the breast is clothed with a yellowish down; its length is about nine tenths of an inch. The perfect insect feeds on the leaves of trees, particularly on those of the cherry. It flies at night in May and June, and often enters houses, attracted by the light. The grub is a white worm with a brownish head, and when fully grown is nearly as thick as the little finger; it devours the roots of grass and other plants, in some cases completely undermining the turf; it is, in turn, greedily eaten by crows and domestic fowls, and the skunk is very fond of the full-grown insects. The best way to get rid of them is to shake the trees in the morning, when they do not attempt to fly, and collect them on cloths spread below; they should then be thrown into boiling water to kill them, when they may be given as food to swine. This insect is also called dor bug. There are several other species of melolonthians in America, varying in size from seven tenths to nine tenths of an inch, all nocturnal in their habits, and more or less injurious to gardens, nurseries, and orchards; they also devour the leaves of many forest trees.

COCKE, an E. county of Tennessee, bounded N. W. by the Nolichucky river; area, about 270 sq. m.; pop. in 1870, 12,458, of whom 1,274 were colored. It borders on North Carolina, and is traversed by French Broad and Big Pigeon rivers. The surface is mountainous and well wooded. Iron or Smoky mountain, on the S. E. border, is the principal range. It is traversed by the Cincinnati, Cumberland Gap, and Charleston railroad. The chief productions in 1870 were 79,007 bushels of wheat, 388,867 of Indian corn, 45,259 of oats, and 88,263 lbs. of butter. There were 1,994 horses, 2,830 milch cows, 4,866 other cattle, 9,730 sheep, and 19,297 swine. Capital, Newport.

COCKER, Edward, an English arithmetician, born about 1632, died about 1675. He was long supposed to be the author of the celebrated arithmetical work called by his name, but an attempt has been made to transfer its authorship to another. Cocker was an engraver as well as a teacher of writing and arithmetic. He is said to have published 14 books of exercises in penmanship, some of which were engraved on silver plates. He excelled as a calligrapher, and Evelyn asserts that his style rivalled that of the Italians.

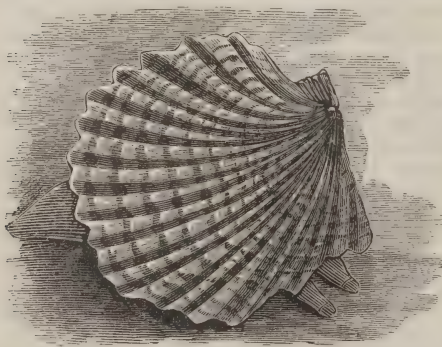
COCKERELL, Charles Robert, an English architect, born in London, April 27, 1788, died in 1863. In 1811-'12 he excavated, with Baron Haller and others, the ruins of the temple of Jupiter in Ægina, and that of Apollo near Phigalia in Arcadia, the antiquities of the former being transferred to the British museum, and of the latter to the museum of

Munich. He also directed many excavations in Italy. In 1840 he became professor of architecture in London, acquiring eminence by his learning and ability, and was made a member of the principal academies of Europe. He was employed as architect by the bank of England, superintending its buildings for more than 20 years. He wrote extensively on archaeological subjects, and in 1860 published an account of his excavations.

COCKERILL, John, an English engineer, born in Lancashire, Aug. 3, 1790, died in Warsaw in 1840. He was the youngest son of an English machinist who had been employed in Belgium. John, with his brother James, also went to that country at an early age. After some preliminary experience, the former in 1816 established a machine shop at Seraing, which became one of the largest in Europe. In the height of his prosperity 2,000 workmen were employed there. This immense establishment belonged one half to the king of Holland, and one half to Cockerill; but at the revolution of 1830 the latter bought the king's share and remained sole proprietor. In 1839 he failed.

COCKERMOUTH, a market town and parliamentary borough of Cumberland, England, at the confluence of the Cocker and Derwent, 24 m. S. W. of Carlisle; pop. in 1871, 7,057. The ruins of a castle, founded toward the close of the 11th century, and razed by the parliamentary forces in 1648, are on a height on the left bank of the Cocker. The town has a free grammar school, some almshouses, and manufactories of linens, woollens, cottons, hats, and hosiery. Near it are extensive coal mines. The poet Wordsworth was born here.

COCKLE, the common name of the bivalve shells of the genus *cardium*, universally distributed, of which about 200 living species are known, besides about 270 fossil species belonging to the upper Silurian formation. The shell is of ventricose form with prominent umbones. The animal is furnished with a pow-



Cockle (*Cardium edule*).

erful foot adapted for burrowing in the sand; and by first bending and then suddenly straightening it, he can also use it to throw himself a considerable distance. *C. edule* lives in the

brackish water of the Thames as high as Gravesend, and is found in the Baltic, Black sea, and Caspian. On the coast of Devon a large prickly species (*C. aculeatum*) is eaten. The cockle of the New England coast is the *C. Islandicum*.

COCKNEY (probably from Lat. *coquina*, a kitchen, and related to the Fr. *Cocagne* and It. *Cuccagna*, an imaginary country of luxurious idleness), a nickname applied to a certain class of Londoners. It has been interpreted to mean a person so delicately nurtured as to be ignorant and incapable of labor, hardship, or any rudeness. The name occurs in verses as ancient as the reign of Henry II. When, during and prior to the reign of Henry VIII., the sages of the Middle Temple were accustomed to disport themselves on Childermas day, it was ordained that the king of the cockneys, with his marshal, butler, constable, and other officers, should be entertained with due service, in "honest manner and good order." The modern cockney mispronunciation consists in the abuse of the consonant *r* appended to words ending in a vowel, as Apollar, sofar, lor, for Apollo, sofa, law. The cockney school of literature is an appellation under which the wits of "Blackwood's Magazine," in its earlier numbers, assailed Leigh Hunt, Hazlitt, Keats, and some other young authors.

COCKROACH (*blatta*, Linn.), an insect belonging to the order of *orthoptera*, and to the group of runners or *cursoria*, having straight wings, and all the legs adapted for rapid motion. The genus *blatta* has five articulations to the tarsi; the wings are folded lengthwise; the wing covers are oval, horizontal on the top of the back, and overlapping on their inner edges; the body is oval and flattened; the antennæ are long and thread-like; the legs have small spines. Cockroaches are general feeders, eating indiscriminately both animal and vegetable substances. They undergo only a partial metamorphosis, their changes consisting in the increase and development of the wings and their covers, which exist as mere rudiments in the nymph state; in other respects the nymph and larva are like the perfect insect, walking and feeding in the same manner. They are nocturnal insects, and live both in the woods and in houses. They run with considerable swiftness. There are several species; those indigenous to this country are found exclusively in woods, under stones and leaves, while the common species, originally from Asia, infests dwelling houses, preferring warm and dark closets, ovens, and hearths, whence they issue at night in search of food. The oriental cockroach (*blatta orientalis*, Linn.) is spread extensively over Europe and America, especially in the maritime towns, being imported from the Levant in ships' cargoes. In many houses they are a perfect pest, devouring all kinds of animal and vegetable articles of food, and even destroying clothing, leather, cotton, and wool; on the approach of a light they escape with

considerable rapidity into their holes. Eat-ables which they cannot devour are often rendered unfit for use by the disagreeable smell communicated to them by their excrements.



Cockroach. 1. Male. 2. Female.

In old houses they swarm in great numbers, and the usual way to get rid of them is by poison. A mixture of red lead, Indian meal, and molasses, in a thick batter, placed at night near their haunts, will be eagerly eaten, and will soon exterminate them. Another more dangerous preparation is a mixture of a teaspoonful of powdered arsenic with a table-spoonful of mashed potato, which may be crumbled about the hearth at bedtime; this requires great caution in its use. Phosphorus mixed in a paste will kill them, and they are often driven away by borax, to which they have a great antipathy. The females lay one or two oval capsular bodies about as thick as one half their body, each containing 16 eggs. The cockroach is terrestrial in all its states, and equally omnivorous and voracious in all.

COCLES, *Horatius*, a hero of the old Roman lays, who defended the Sublician bridge, in conjunction with *Spurius Lartius* and *Titus Herminius*, against the whole Etruscan army under *Porsena*, while the retreating Romans broke down the bridge behind them. When the work of destruction was nearly accomplished, *Horatius* sent back his two comrades, and as soon as the bridge was altogether destroyed, he himself plunged into the Tiber and swam across to the city in safety, amid showers of arrows from the enemy. Rome raised a statue to his honor in the comitium, and granted him as much land as he could plough around in one day.

COCOA, a preparation of the seeds of the tree called by *Linnaeus* *theobroma cacao*. (See *CACAO*.) Several varieties of the tree have been since described, which produce beans, or seeds, varying somewhat in their size and properties. Their use is for the manufacture of chocolate. The article was unknown in Europe till it was introduced from Mexico in 1520 by the Spaniards; with them its preparation was long afterward kept secret. The seeds are prepared for use by roasting in the same way as coffee is roasted. When the

aroma is well developed, the beans are turned out into shallow wooden vessels and stirred till cool. Those which have been fermented now lose the shells readily, and split open into several lobes like split beans. The shells, amounting to about 12 per cent. of the whole weight, are separated by winnowing, and form an inferior quality of cocoa known as shells. The split seeds thus prepared may be used for food by long boiling; but for making chocolate they are ground, and mixed with other substances. (See *CHOCOLATE*.) Their average composition, according to *Johnston*, is nearly as follows: water, 5 per cent.; starch, gum, &c., 22; gluten, &c., 20; oil, 51; theobromine, 2. The theobromine is a white, crystallizable substance, similar to the theine in tea, but contains more nitrogen. The other constituents, as starch, gum, gluten, and the large proportion of fat, give to cocoa the variety of nutritive qualities possessed by milk, and like this it contains every ingredient necessary to the growth and sustenance of the body. A volatile aromatic oil and a bitter and an astringent principle are present, which affect the taste and qualities of the cocoa, though they are not detected in the analyses. The former is developed in the roasting, and is the cause of the aroma which is then exhaled. The fatty oil, called cocoa butter, resembles tallow in whiteness and consistence; it melts at 122° F., and in this condition may be separated by expressing it from the other ingredients. It has a mild and agreeable flavor, and is not apt to turn rancid. Neither tea nor coffee possesses the nutritive oily matter of cocoa, and of the gluten which is contained so largely in tea a considerable proportion remains in the leaves when the infusion is prepared. The shells contain but little theobromine and fat, a small portion of mucilage, no starch, but much vegetable tissue or lignine. Their infusion in boiling water is much used as a substitute for tea and coffee. Its taste is somewhat like that of chocolate, but weaker. The irregular-shaped, angular pieces into which the seeds separate by pressure after the shell is removed, are called nibs; they are the purest form in which cocoa can be purchased, being the kernel deprived of its husk and unadulterated. Their structure, exposed by the microscope, is seen to be that of minute rounded cells, which are filled with starch corpuscles and fatty matter. The fragments of the cells and the starch corpuscles may still be detected in the finely ground powder of the cocoa prepared for chocolate; and in this way the presence of undue proportions of the shells is exposed, as also of the numerous other matters used as adulterants. Cocoa should properly be the pure paste prepared by grinding the nibs between heated stones, and rolling into a flaky mass the oily product which flows out. This, when moulded and cooled, is called flake or rock cocoa; but the name of cocoa is often applied to compositions of the pure article with

other substances, which properly come under the designation of chocolate. The oil of the cocoa is extracted for certain cosmetic unguents and applications for the hair; after which the remainder of the flour is made into an inferior article called broma, which however is much liked by many persons who object to the richness of chocolate or cocoa.—The imports of cocoa, not including chocolate, into the United States in the year ending June 30, 1872, were 4,917,809 lbs., valued at \$600,640.

COCOANUT OIL, or **Cocoanut Butter**, the fixed oil of the fruit of *cocos nucifera*, obtained either by expression or decoction. It is of a fine white color, of the consistence of lard at ordinary temperatures, becoming solid between 40° and 50° F., and liquid at 80°; of a bland taste and a peculiar and not disagreeable odor. It contains various solid and volatile acids. This oil, or fat, should not be confounded with cocoa or cacao butter (*oleum theobromæ*), which is obtained from the cacao nut. It is somewhat used in pharmacy as a substitute for lard, over which it has some advantages, and in medicine as a substitute for cod liver oil. The liquid part of the fat, or coco-oleine, has also been used for the same purposes.

COCOANUT TREE (*cocos nucifera*, Linn.), one of the best known of the great family of palms, and perhaps also the most useful. There is a saying among eastern nations that its attributes would fill a book. Although a native of the tropics, and flourishing only on the seashore, it will grow as far north as Lucknow in India (lat. 26° 50' N.), and is planted far in the interior of that peninsula; but in the one case it does not bear fruit, in the other it is dwarfed and languishes. In conservatories the cocoanut seldom lives more than 10 or 12 years. The centres of the geographical range of this palm are the islands bordering on the Indian and central Pacific oceans. It is also found in the tropics of America, but is there considered rather an article of luxury than of necessity. The tree attains a height of from 60 to 100 ft., and a diameter of one or two feet. Its cylindrical, gently tapering trunk, usually somewhat inclined, from the constant winds of the tropics, is crowned by numerous feather-like leaves from 18 to 20 ft. long. The flowers appear on the axils of the leaves, and are enclosed in a thick tough spathe; when this first opens, the clusters of small, three-parted flowers have a beautiful milk-white appearance, although they soon become yellowish. The spathe opens always on the under side, and soon falls off, leaving a spicate spadix bearing the female flowers near the base. As in most palms, the blossom is beautiful from the great number of the florets rather than from any individual grace. In favorable places these clusters are produced every six weeks during the rainy season, and each one ripens from 5 to 15 nuts. Each tree thus has a succession of fruit, and may produce from 80 to 100 nuts a year. In planting the nut the three black spots on one

end are left uppermost. From one of these the stem rises, and the shell is soon split. Often the nut does not begin to germinate for six months, or even a year, after planting, while it is sometimes seen sprouting when lying on the ground, with its husk still green. Its growth is very slow for the first two years, and not until six or seven years old does it begin to bear, continuing until 70 years, or even longer. After the tree ceases to bear, the wood becomes very hard, and from its peculiar fibre is known as porcupine wood. Where it grows it is used for posts and rafters to houses, and the immature wood, which has a soft centre easily removed, is used for water pipes. The rootlets are astringent and are used for chewing. The leaves are usually 12 or 15 in number, and 5 or 6 are formed every year, the old ones dropping off, and leaving the horizontal scars that ornament the trunk. The new leaf is enclosed in a tough fibrous sheath, which is used as a strainer, or even for clothing; the



Cocoanut Palm.

pointed, solid leaf soon bursting through it, and by the elongation of its midrib becoming a pinnate leaf. When fresh the leaves are cooked and eaten as cabbage. The dry leaves are plaited together, and form the covering for the roofs and sides of bungalows. The base, with the midrib, serves as a paddle; the midrib as an arrow or spear; the lateral ribs, when stripped, make good brooms. The leaflets serve for paper, the writing being made with a sharp point, and cow dung is usually rubbed in to make the characters more distinct. The leaves are also used for fans, fences, thatch, bedding, fish nets, sieves, and hats. The smaller ribs are made into neat combs. The whole makes a good torch, and is also burned by the washerwomen for its potash. The flowers contain a most powerful astringent, and in Ceylon are used medicinally in various debilitating diseases. Before they burst from the spathe, the sap, or toddy, is obtained by bruising and sli-

cing the base or extremity. The quantity collected in this way varies, and always diminishes the yield of fruit. When fresh the toddy is delicious, and acts as a gentle aperient. Fermentation takes place in a few hours, and the liquor is then known as palm wine, which is a pleasant drink, and is much used by bakers for yeast. By distillation toddy yields 25 per cent. of arrack. By allowing the fermentation to proceed, a good vinegar is obtained; and by boiling the fresh toddy a tolerable sugar, or *jaggery*, can be made. Eight gallons of sweet toddy yield two gallons of a luscious liquid called *pervin* by the Cingalese; and the brown sugar obtained from this by further boiling is formed into round cakes, and eaten or exported. The husk of the cocoanut is very fibrous, and contains considerable silica. Cut transversely, the halves of the nut make excellent scrubbing brushes for the decks of ships. The husk when dry is stripped off by means of a small stake fixed in the ground, and a man can strip 1,000 nuts a day; the husks are then soaked for several months in water to separate the fibres, and finally twisted into rope, or woven into mats, under the name of *coir*. The rope is very strong and light, does not rot when wet, and floats on the water. It is stronger and more elastic than hemp, and is preferred to hemp or chain for cables, as enabling a ship to ride easily at anchor in rough weather. Forty nuts usually yield six pounds of coir. The Polynesians twist and braid small cords of this fibre, which, as "sinnet," serves in the construction of houses and canoes, where Europeans would use nails. The shell of the nut within this husk is very hard when fully ripe, and takes a fine polish; burnt, it forms good lampblack, and as charcoal is in demand as a dentifrice. When the nut is still green it contains from one to two pints of a rich clear liquid, always cool when first gathered from the tree, and the shell is lined with a gelatinous soft mass, which is eaten either alone or flavored with various juices. An analysis of this liquid shows in 1,000 parts:

Water	900.88
Sugar	4.48
Gum	17.67
Extractive matters (oil)	28.29
Salts soluble in alcohol	5.44
Salts insoluble in alcohol	6.29

When taken to excess, it produces strangury, but people often drink nothing else for weeks without bad effects. When the nut is gathered with the stem attached, it may be kept fresh at sea for several weeks, and the water is considered a good remedy for seasickness. It is also used with lime in making *chunam*, a hard plaster, and in various processes of cooking. As the nut ripens, the albumen is deposited in a thick lining in the shell, and the liquid becomes insipid. The albumen in this form may be eaten, and is cooked in various ways, always forming an important ingredient of genuine curries and mulligatawnies. It contains much oil, and the Polynesians chew it up and rub it into their hair as a

pomatum. The oil is perhaps one of the most valuable products. The Micronesians break up the ripe nuts and expose the meat to the heat of the sun in covered troughs, keeping the mass constantly wet. Fermentation takes place, and the oil drops out into receivers. The East Indian process is almost as rude, the broken nuts being ground in a wooden or stone mill of primitive construction. The product varies in quantity as well as in quality; 10 nuts sometimes produce a quart of oil, and at other times 30 yield only three pints. In some places the ground nuts are pressed or even boiled, but the oil thus obtained is inferior. The best oil is used for cooking purposes, or to anoint the body, a most grateful process in a hot climate, and the inferior sorts for illumination. Large quantities are imported into the United States and England for the manufacture of candles and soap. The cocoanut is an example of the palms that have two of the three ovules regularly abortive, the third occupying the whole inner surface of the nut, and in germination sending the radicle through the only one of the three apertures in the shell which remains soft.

COCO-MARICOPAS, or *Maricopas*, a tribe of semi-civilized American Indians, living upon the river Gila, Arizona, about 150 m. above its mouth. They occupy a portion of the rich alluvial valley found there, in common with another tribe known as the Pimas, which holds the same rank in civilization. The valley is there about 15 m. in length, and from 2 to 4 m. in width, nearly the whole of which is occupied by the villages and cultivated fields of these two tribes. The Pimas occupy the eastern portion. There is no dividing line between them, nor anything to distinguish the villages of one from those of the other. Their joint reservation, as established by congress, on both sides of the Gila, is about 25 m. long and 4 m. wide, extending from Maricopa Wells to below Sacaton. The whole of this plain is intersected by irrigating canals from the Gila, by which they are enabled to control the water, and thereby raise luxuriant crops. The villages consist of groups of from 20 to 50 habitations, surrounded by gardens and cultivated fields, the latter fenced with crooked stakes wattled with brush. Their houses are built with stakes, poles, corn husks, and straw. These habitations are from 5 to 7 ft. in height, and in diameter from 15 to 25 ft. There is usually a bower or shed attached to each wigwam, open on all sides, beneath which the occupants are generally seen engaged in their household duties, only resorting to their better protected abodes in cool or rainy weather. Besides the dwelling places, each family is provided with a storehouse or granary, better built than the former. These Indians possess horses, mules, and horned cattle. When ploughing is resorted to, oxen only are used; but they prefer to use the hoe for turning up the light soil. With this

simple instrument and a long-handled spade, they are able to cultivate as much ground as they require. The men generally plant and gather the crops. The food of these people is chiefly bread, made both of the flour of wheat and maize, and vegetables. Little meat is used. But that which elevates these tribes above most other aborigines is their knowledge of the art of spinning and weaving, an art known to the semi-civilized tribes of New Mexico before the arrival of the Spaniards. Cotton of a superior quality is raised by them, which they spin and weave into blankets of various textures and sizes, a heavy cloth used by the women to wrap around their loins, and an article from three to four inches wide, used as a band for the head or a girdle for the waist. The implements used for spinning and weaving are of the most primitive character. Their other manufactures are baskets and pottery. The basket work is remarkably well made of willow twigs, of various shapes, and used for different purposes. Their pottery is either red or dark brown, some of it quite fine, though not equal to that made by the ancient tribes, fragments of which cover the adjacent grounds. It consists of vases and cups holding from half a pint to six or eight gallons, jars with small apertures, basins of every size, and oblong vessels used as dippers. The ornaments on their pottery and their cotton manufactures closely resemble those on the pottery found among the ancient ruins and sites of ancient towns throughout New Mexico. They resemble, too, the ornaments of the Pueblo or semi-civilized Indians of the country, which leads to the inference that the Coco-maricopas, the Pimas, and the Pueblo Indians generally, are descendants from the ancient people who have left so many remarkable works in the great basin of the Colorado. The dress of the women is simply a cotton blanket or cloth wrapped around their loins. Sandals of raw hide are worn on the feet. Nothing is worn on the head, nor is the hair ever tied up. In front it is cut off square across the eyebrows; the rest is suffered to hang loosely over the ears, neck, and half way down the back. It is a universal custom among the women, when they arrive at maturity, to draw two lines with some blue-colored dye from each corner of the mouth to the chin. This is pricked in with a pointed instrument, and remains through life. The men generally go naked, except the breech cloth. In cool weather they throw one of their native blankets over their shoulders. Much pains is taken in decorating the head. They wear their hair long, never cutting it except across the eyebrows. When loosed, it reaches to their knees; but usually it is clubbed up in a large mass on their backs. This people restrict themselves to a single wife. They believe in the existence of a great spirit and in an existence after death; that their souls go to the banks of the Colorado, their ancient dwelling

place, where they are metamorphosed into various animals and birds; they believe, too, that the feuds which have existed on earth between them and other tribes will continue after death. The Coco-maricopas lived originally on the Colorado, but were found about 50 miles beyond their present location early in the last century. In 1775 Father Font found them on the river Salinas, 10 or 20 miles from the Pimos. Subsequently they removed for protection to the valley occupied by the Pimos, with whom they live on terms of the greatest harmony, and whose customs they have adopted. Their languages are totally different. The language of the Coco-maricopas has a close affinity with that of the Yumas of the Colorado, and Comeyas of California. The Maricopas numbered in 1870 only 382 in two villages, and are rapidly disappearing from their contact with the whites.

COCOON, an oblong ball or case, in which the silkworm involves itself, formed from the very fine filaments from which silk thread is made. The term is also applied to the envelope of other larvæ during their pupa state. (See BUTTERFLY, CATERPILLAR, and SILKWORM.)

COCOPAS, a tribe of Indians allied in language to the Yumas, living upon the Colorado river of California, between the mouth of the Gila and gulf of California. They number less than 500 souls, and live by cultivating the soil. In the report of Don José Cortes to the king of Spain, made in 1799, this tribe is mentioned as then embracing 3,000 souls.

COCYTUS, in antiquity, a river in Epirus deriving its brackish water from the melted snow of Mount Pindus, and emptying, after a course underground, into the Acherusian lake.—Also a river of the infernal regions, a tributary of the Styx, emptying with the Pyriphlegethon into the Acheron.

COD (*morrhua*, Cuv.), a genus of soft-rayed fishes belonging to the family of *gadidae*, characterized by an elongated, smooth body, compressed toward the tail; three dorsal fins; ventral fins pointed; abdominal line with two fins behind the vent; the lower jaw with one barbule on the chin. There are eight species



Cod (*Morrhua Americana*).

described as occurring in North America. The American cod (*M. Americana*, Storer) is the common species of the New England coast, ranging from New York to the St. Lawrence river.

The color of the back in the living fish is a light olive-green, becoming pale ash in dead specimens, covered with numerous reddish or yellowish spots to a short distance below the lateral line; beneath it is dusky white. The color of this species, however, is variable; some are of a greenish brown hue with few spots; others, called rock cod, are of a bright red color; some are very dark, others very light and greenish. This species grows to a great size; the largest specimen alluded to by Dr. Storer, in his "Report on the Fisheries of Massachusetts," weighed 107 lbs.; the average weight is about 8 lbs.—The common or bank cod (*M. vulgaris*, Linn.), well known the world over as an article of food, is taken on the Grand bank, in the deep water off the coast of Newfoundland, Nova Scotia, and Labrador, and indeed is met with from the coast of Maine to lat. 67° N. It is a thick, heavy fish, sometimes attaining a weight of 90 lbs. The color varies considerably, but is generally a greenish brown, fading into ash in the dead fish, with numerous reddish yellow spots; the belly is silvery opaque white, the fins pale green, and the lateral line dead white.—A third species, the tomcod (*M. tomcodus*, Mitchell), is found along the American coast from New York northwardly to Nova Scotia and New Brunswick, at all seasons of the year; it frequently ascends rivers. It varies in length from 6 to 12 inches. The colors also vary exceedingly, being generally brownish above with spots of a darker hue, and lighter beneath. The tomcod is caught from wharves and bridges by almost any bait; in the winter large numbers are taken in dip nets at the mouths of rivers. The cod is abundant along the N. Pacific coast, particularly in the region of Alaska. It also swarms along the W. and N. shores of Norway, in the Baltic, off the Orkney and Western islands, and on the S. and W. coasts of Iceland. It is an exceedingly voracious fish, devouring indiscriminately everything in its way in the shape of small fish, crustacea, and marine worms and shell fish. Indeed, the cod is the great collector of deep-sea specimens, otherwise unattainable; and many are the specimens of rare and new shells which naturalists have obtained from its capacious stomach.—The cod is very prolific. A cod roe has more than once been found to be half the gross weight of the fish; and specimens of the female have been caught with upward of 8,000,000 eggs. Were all these to come to maturity, a pair of cod would in a few years fill the ocean; but only a portion of the eggs are fertilized, and only a small percentage of the fish ever arrives at maturity. The cod spawns in mid-winter, but its habits have not been observed with sufficient accuracy to determine when it becomes reproductive. The best authorities hold that it is an animal of slow growth, and that it is at least three years old before it is able to propagate. A question of great interest is, whether it is possible by over-fishing to ex-

haust the cod fisheries either partially or entirely? As yet no serious impression appears to have been made on the bank fishery, after 3½ centuries of ceaseless fishing. The same, however, cannot be asserted in regard to the shore fishery, at least at certain points; and the frequent complaints of late years of the scarcity of fish in certain bays, as compared with former times, and the numerous failures in the summer fishery, awaken the suspicion that the perpetual drafts, year after year, without any interval for recruiting, have seriously reduced the number of codfish in certain localities. The scarcity of cod in Conception and Trinity bays, and other places, of late years, as compared with former times, is generally allowed; and the bulk of the population of these bays now proceed to Labrador for their summer fishing. The theory of the migration of fish, once a general notion, is now known to be a popular delusion, and has been abandoned by all scientific naturalists. The migratory instinct in fish is ascertained to be very limited, merely leading them to move about a little from their feeding ground to their spawning ground—from deep to shallow water. In fact there are in the world of waters great fish colonies, as there are great seats of population on land; and these colonies are stationary, having comparatively but a limited range of water in which to live and die. All around the shores of Newfoundland are numerous banks, or submarine elevations, of greater or less extent, which constitute the feeding and breeding grounds of the cod; and each of these has its own fish colony that live and die within a limited range of their own habitat. They do not intermingle with other colonies or invade their domains. This is proved by the well known fact that the cod of different localities are marked by distinctive features and qualities; the cod, for example, of Placentia bay being quite distinguishable from that taken in Bonavista bay. So, too, the vast fish colonies of the great banks, at a considerable distance from the shores, differ from shore fish, being larger and finer, and, except a few adventurous individuals that roam from home, are not found at any distance from the place of their birth. The bank and shore fish keep to their respective homes. If heavy drafts are made on the smaller colonies around the shores and in the bays, in the course of years these will become seriously diminished in numbers. Facts seem to indicate that this is the case in many localities at present. The average catch of codfish now is not greater than it was 50 years ago, though many thousand more hands are now engaged in fishing.—Cod fishing is an important branch of industry, the Roman Catholic countries of Europe, South America, and the West Indies furnishing a ready market. The great resort of the American, Nova Scotian, and French fishermen is the Grand bank of Newfoundland, and the banks E. and S. E. of Nova Scotia, which

may be distinguished as the western banks, the westernmost being known specifically as the Western bank. The Miquelon islands and St. Pierre, off the S. coast of Newfoundland, belonging to France, are the rendezvous of the vessels of that nation. Of the United States, Massachusetts is the most extensively engaged in the fishery, the principal ports being those on Cape Cod, with Plymouth, Kingston, Marblehead, Beverly, and Gloucester. Maine comes next by a long interval, the principal places engaged being Portland, Wiscasset, Boothbay, Waldoborough, Belfast, Castine (employing more vessels than any other town in the state), and the ports about Frenchman's bay. Gloucester is the great fishing port of the country. A few vessels from this town make winter trips, from three to five weeks in length, to the Western bank, the number increasing after the beginning of February. In this month also fishing commences on Georges bank (S. E. of Massachusetts), the trips averaging three or four weeks. The Georges fleet is largest in March, begins to decrease in April, and almost disappears in June. As the weather grows milder and the Georges fleet diminishes, the Gloucester vessels commence their trips to the fishing grounds off Cape Sable and Cape North, in the gulf of St. Lawrence, and on the Western and Grand banks. The trips to the Grand bank rarely exceed 12 weeks in length, those to the western banks 9 weeks. The Cape Cod vessels do not engage in winter fishing. About five sixths of them sail for the banks during the first half of April, and make two trips, or "fares," arriving on their first fare early in June, sailing again the last of that month, and arriving on their second fare the latter part of August or first of September. The remaining sixth sail about the middle of May, and make but one fare, arriving in August or September. Provincetown vessels, however, all make one long trip to the Grand bank, sailing in April, and sometimes prolonging their stay until October. Marblehead and Beverly vessels that make two fares arrive on their first fare in July or August, and on their last in November. The vessels employed are schooners of from 45 to 100 tons, averaging 60 or 70. The number of the crew varies from 9 to 14, sometimes exceeding the latter number. The bank fishermen all use dories, or flat-bottomed boats, which are sent out, usually twice a day, a short distance from the vessel, which lies at anchor on the fishing ground. The larger proportion (perhaps three fourths) of the Massachusetts vessels use trawls, which are set and hauled periodically. The trawl consists of a long line anchored and buoyed at each end, with hooks, generally several hundred in number, adjusted at intervals. The trawlers use dories about 15 ft. in length, usually carrying one for every two men. The fishermen that use hand lines carry a dory 12½ ft. long for each man except the cook, and in the largest vessels the "skipper," as

the captain is called. Owing to the strong tide on Georges bank, the fishermen do not use dories there, but fish directly from the vessel. The Maine vessels carry larger crews than those from Massachusetts, and use hand lines. The trawlers use fresh bait, herring, mackerel, or squid; the hand-liners use salted clams for the first of the season, but afterward usually obtain squid. The fish when brought aboard the vessel are dressed and salted in the hold. Upon arrival home they are taken out, washed, and dried on flakes, or platforms of wickerwork, on the shore. The process of dressing them is reduced to system, and is performed with great rapidity. The throater, usually a boy, cuts the throat and rips them open; the header removes the entrails and the head; the splitter splits the fish, removing a portion of the backbone; while the salter piles them in tiers and sprinkles them with salt. There are two principal methods of employing the crew. Under one system, a portion of them, called sharesmen, take the risk of the voyage and hire the rest of the men. These shares number from one to five, three or four being the usual number. There may be whole shares or parts of shares, the latter occurring when a portion of the compensation is at the risk of the voyage and the rest is received in wages. The hired men receive from \$150 to \$250 for one fare, and from \$200 to \$300 for two fares. The cook is usually paid from \$50 to \$60 a month. In settling the voyage, as it is termed, the skipper takes a small proportion of the gross stock, generally 3 per cent. The "great general supplies," consisting of salt, bait, dories, fishing tackle, &c., are then deducted; the owners of the vessel next draw one fourth; one eighth of what remains is paid for curing the fish; the provisions are then paid for; and finally the wages of the hired men are deducted. Whatever is still left is divided among the sharesmen, the skipper drawing a share in addition to his percentage. With fair success, the sharesmen will draw about 45 per cent. of the gross proceeds, though the proportion varies of course according to circumstances, and they sometimes fail to pay their expenses. This system is in use on Cape Cod, and in Plymouth, Marblehead, and Beverly. By the other method the owners equip the vessel, and buy the fish green upon her arrival, at the market price for the time being. The crew receive half the proceeds, paying only half of the bait bill and of the cook's wages, having left about 45 per cent. net, which in vessels that use trawls is generally divided equally, but in the case of those that use hand lines is commonly shared among the crew according to their respective catch, or on the "own hook lay." This system is in vogue in Gloucester. The Maine fishermen use the same method, but do not sell their fish until cured. The Nova Scotia vessels mostly use trawls. The sharesmen, six or eight in number, hire the boys and ordinary fishermen, and

divide the proceeds according to the system last described. The French fishermen leave home with their salt, provisions, &c., in the latter part of winter or early spring, and come directly to St. Pierre, where they equip for fishing, generally making two or three trips to the banks from that port. Their fishing season extends from April to October. Their vessels range in size from barks of 300 tons to shallops of 20 tons. They all use trawls equipped with 6,000 or 8,000 hooks, which are set at night and hauled in the forenoon, and boats of sufficient size to weather any ordinary gale, each manned with seven men. They procure their bait at St. Pierre, using salted herring for the first fare and capelin for the other two. A portion of the fish is cured at St. Pierre, but the greater part is taken green to France, and there cured. Some vessels from Cape Cod are employed in fishing on the shoals that lie along the coast from Nantucket N. to the extremity of the cape. They make short trips, returning every two or three weeks to land their fish and procure fresh bait. Many boats are also employed from the shore. Large quantities of cod are brought in fresh to the markets of New York, Boston, and other cities, by the numerous small vessels engaged in market fishing. Cod fishing from Cape Breton and Newfoundland is pursued almost exclusively in boats from the shore. The smallest of the fish, instead of being dried, are sometimes preserved in pickle and sold by the barrel. The dried fish are sold by the quintal of 112 lbs. Codfish are sometimes cured by being kept in a pile for two or three months after salting, in a dark room, covered with salt grass or the like, after which they are opened, and again piled in a compact mass for about the same length of time. They are then known as dun-fish, from their color, and are highly esteemed. Of the fish caught on the banks with hand lines previous to the first of July, it takes about 50 to make a quintal of dried fish; after that date 30 will yield a quintal. Fish caught with trawls average 36 to the quintal throughout the year. The livers are preserved, and the oil obtained from them is valuable as a medicine in pulmonary complaints. The tongues

and sounds are also frequently preserved in pickle. From the sounds, prepared and dried, isinglass is obtained.—According to the United States census of 1870, the product of the American fishery for that year was 559,982 quintals of cod, of which 28,484 quintals belonged to Connecticut, 79,373 to Maine, 451,125 to Massachusetts, and 1,000 to Washington territory. In that year 94,750 quintals were caught in Alaskan waters, and brought mostly into San Francisco. For the year ending June 30, 1871, there were entered in the various customs districts 658,756 quintals of cured cod (product of domestic fishery), valued at \$3,747,535; oil, other than whale (chiefly cod-liver), 729,558 gallons, valued at \$420,146. For the year ending June 30, 1872, there were entered 727,487 quintals, valued at \$3,194,286, and 1,437,343 gallons of oil, valued at \$508,402. These figures do not include large quantities of cod brought in by coasters, fishing smacks, &c., not making entry at the custom houses, of which there are no trustworthy statistics. The number of men in the United States employed in the cod fishery is from 12,000 to 15,000. The government, regarding the cod fishery as a nursery of seamen for the navy, by the acts of 1813 and 1819, offered a certain sum per ton as bounty to vessels engaged in the business. The payment of bounties was discontinued by the act of July 28, 1866, to which time about \$16,000,000 had been expended; but the duties on imported salt used in curing fish are remitted. The product of the British American fishery for 1869 was as follows: province of Quebec, 136,774 quintals of cod, valued at \$410,322; 103,018 gallons of oil, worth \$51,509; and 287 barrels of tongues and sounds, value \$2,009; New Brunswick, 17,924 quintals of cured cod; Nova Scotia, 355,638 quintals; Prince Edward island, value of cod, &c., obtained, \$39,893; Newfoundland, exports of cod, 1,204,086 quintals, valued at \$5,514,040; 1,224,468 gallons of cod-liver oil, value \$978,425; 964 barrels of cod roes, worth \$3,615. The number of men in Canada and Newfoundland engaged in cod fishing is from 40,000 to 50,000. The product of the French fishery from 1863 to 1868 was as follows:

RECEIPTS AT THE FRENCH PORTS, IN QUINTALS.

PRODUCTS.	1863.	1864.	1865.	1866.	1867.	1868.
Cod, green.....	416,880	428,644	428,310	516,220	585,770	539,870
“ dry.....	81,506	109,806	113,836	80,063	116,154	76,310
Oil.....	26,812	28,352	37,268	39,840	40,760	40,572
Oil, crude.....	2,746	6,332	3,834	2,468	2,384	2,398
Roes.....	4,496	3,750	2,402	5,406	6,452	7,366
Other products (tongues, sounds, &c.).....	13,126	16,458	18,050	19,114	22,900	21,738

Of the cod obtained in 1868, all but about 3,000 quintals was from the Newfoundland and Iceland fisheries known as *la grande pêche*. The value of the green and dry fish in 1868 was \$3,331,917; of the oil, \$504,647. A quintal of oil is equivalent to about 12 gallons. The French government has spent large sums

by way of bounty for the encouragement of cod fishing, a premium being paid as well upon the export of the fish as upon the vessels engaged in the business. The following table exhibits the number of vessels and men engaged in the fishery, the exports of cod, and the bounty paid, from 1863 to 1868:

YEARS.	Vessels.	Men.	Bounty.	EXPORTS.			
				FROM PLACES OF FISHERY.		FROM FRANCE.	
				Quintals.	Bounty.	Quintals.	Bounty.
1863.....	560	13,753	\$133,590	142,991	\$279,722	61,391	\$92,060
1864.....	467	12,774	122,064	144,004	250,629	58,673	88,353
1865.....	573	12,434	120,087	166,095	324,224	54,913	77,367
1866.....	583	12,651	120,498	174,893	347,192	53,045	72,331
1867.....	603	12,178	115,670	145,876	288,829	57,992	59,651
1868.....	654	13,164	124,923	111,795	222,310	26,863	38,803

The aggregate tonnage in 1868 was about 80,000. The principal fishing ports are Dunkirk, Bordeaux, Cette, La Rochelle, Marseilles, Granville, St. Servan, St. Malo, Boulogne, Paimpol, and Gravelines.—The cod fishery of the British islands is important, and is pursued chiefly in the vicinity of the Shetlands and Orkneys, off the shores of Essex, Suffolk, Norfolk, and Lincoln, and around the Dogger bank. The catch of the English coast is mostly taken fresh to the London market. The returns are imperfect, but, so far as reported to the officers of the fishery board, the product of cured cod, ling, and hake in 1870 for Scotland amounted to the sum of 145,289 quintals of dried and 9,945 barrels of pickled fish. In 1870, 277 vessels were employed in cod fishing in Belgium, and obtained 30,604 quintals; the product for 1868 was 53,782 quintals. The most important European fisheries are those of Iceland and Norway. In Iceland the most productive cod fishing commences in February or March, and continues till May or June. In that island and Faroe from 75 to 100 deck boats and from 4,000 to 5,000 open boats, manned by 10,000 to 15,000 men, are employed. The annual product is about 100,000 quintals, of which 20,000 go to Denmark, 50,000 to Spain, Italy, &c., and the remainder is consumed by the islanders. In 1862, an abundant year, 59,123 quintals of "clipfish" (dried salted cod), and 6,525 of "stockfish" (dried unsalted cod), 6,557 barrels of liver oil, and 1,489 of roes were exported from Iceland; in 1865 the exports were only 22,036 quintals of clipfish and 313 of stockfish; in 1869, 46,819 quintals of clipfish, 3,954 of stockfish, 977 barrels of roes, and 7,744 of liver oil. The Norwegian cod fishery is carried on along the whole W. and N. shore of the country, particularly near the Loffoden islands, and commences in December; the best months are January and February. In 1866, 5,723 boats and 25,756 men were employed. The exports for 1865 were 490,344 quintals of clipfish, 332,398 of stockfish, 33,771 barrels of cod, 37,941 of roes, and 1,896,346 gallons of liver oil. The roes are principally used as bait for sardines. Besides the exports enumerated, it is estimated that from 200,000 to 300,000 quintals are annually bartered to the Russian traders of the White sea. In 1871, 18,500,000 cod were caught in the Loffoden fish-

ery, yielding 428,214 quintals of fish, 25,000 barrels of roes, and 31,000 of oil. The other principal fishery, that of Finmark, produced 12,500,000 cod. The exports were valued at about \$6,000,000. (See FISHERIES.)

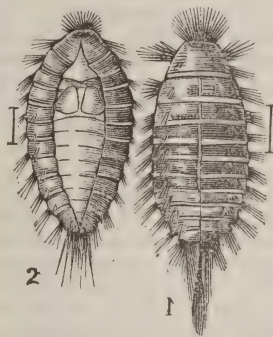
CODDINGTON, William, founder of the colony of Rhode Island, born in Lincolnshire, England, in 1601, died Nov. 1, 1678. He arrived by the ship *Arabella* at Salem in 1630, as one of the magistrates of Massachusetts appointed by the crown. For some years he exercised his judicial functions, traded as a merchant in Boston, and accumulated considerable real estate at Braintree. In 1636, when Winthrop superseded Vane as governor, Coddington's name was dropped from the roll, but the freemen on the following day testified their approval of his course by sending him and Vane as their deputies to the court. When Mrs. Hutchinson was tried, during the Antinomian controversy, Coddington undertook her defence against Winthrop and his party. He also opposed the proceedings in the case of Wheelwright and others, but unsuccessfully. Becoming wearied of opposition, he removed with 18 others (April 26, 1638) to the island of Aquidneck, now Rhode Island, having drawn up and signed an agreement to found a colony which should be "judged and guided by the absolute laws of Christ." This being found too vague for actual requirements, Coddington was elected judge, with a council of three elders, who were enjoined by a vote of the freemen to be guided by God's laws. This arrangement was further modified, March 12, 1640, by the election of Coddington as governor, with a lieutenant governor and four assistants. He continued in office seven years, until a charter was obtained and the island incorporated with the Providence plantations. In 1648 he was again offered the governorship, but declined it in consequence of a suit he was engaged in respecting lands. Having made a voyage to England in 1651, he returned with a commission as governor of Aquidneck island, separate from the rest of the colony; but the people being alarmed at the attempt to deprive them of the nomination of their rulers, he resigned. From this time he withdrew from public affairs till 1674-'5, when he once more accepted the governorship. Coddington, after his settlement in Rhode Island, adopted the tenets of the Quakers.

SUPPLEMENT TO VOLUME IV.

CARPET BEETLE

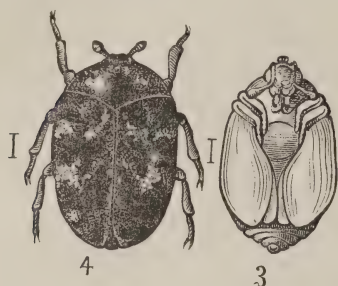
CARPET BEETLE. This destructive insect, which, in various parts of the United States, has become much more injurious to carpets than the carpet moth, is a recent importation from Europe; and, like many of the previously introduced insect pests, its depredations have assumed a greatly increased importance under the new conditions presented to it in its new home. It has long been known in Europe, where it was described by Linnæus more than a century ago as *anthrenus scrophulariæ*. Its specific name was drawn from the plants which it frequented. It is common throughout a large part of Europe, and the beetle is often seen on the blossoms of fruit trees and on various kinds of flowers, feeding upon the pollen. The larva is recorded as of frequent occurrence in houses, where it is quite a promiscuous feeder, and often proves very destructive to furs, clothing, woollen articles, dried meats, leather, collections of animals, birds, and insects, plants in herbaria, &c. The earliest record of its appearance in this country (recently published) is, that it was observed in carpets at Buffalo, N. Y., in 1872, and in the following year was discovered in Cambridge and Boston, Mass. Public attention was first drawn to its ravages through newspaper notices published in the state of New York during the summer of 1874. Its injuries to carpets had been very serious, and were exciting wide-spread alarm. In 1876, from examples of the larvæ obtained at Schenectady, N. Y., where the pest abounded, Prof. J. A. Lintner, of the New York state museum of natural history, reared the perfect beetle, and ascertained that it belonged to the genus *anthrenus*, of the destructive family of *dermestidæ*. In a paper communicated by him to the Albany institute, Oct. 17, 1876, an account of its habits and transformations was presented and its scientific name given, it having been identified with the *A. scrophulariæ* of Europe by the eminent coleopterist Dr. Le Conte of Philadelphia. A variety of the spe-

cies, *A. lepidus* (Le Conte), had been collected on flowers in California in 1850, where it is believed to have been introduced from southern Europe, perhaps during the Spanish occupation of that country.—In the accompanying figures the insect is represented in its different stages, largely magnified, the natural size being shown by the hair lines. Fig. 1 represents the larva—the form in which it generally comes under the observation of housekeepers, and in which it commits its depredations. Its length, including its terminal pencil of hairs, is three eighths of an inch. Its rings are banded with dark brown; its head has a brush of dark-brown hairs, and its sides are clothed



with long, brown, bristly hairs pointing backward; the terminal pencil of hairs, extended in a tail, is often, in the perfect larva, nearly as long as the body, but becomes worn away as it approaches pupation. Fig. 2 shows the cast skin, which is thrown off several times during the growth of the larva, and is often found in large numbers in the floor crevices or other places where the insect abounds. Fig. 3 represents the pupa, the third stage of its transformation (first, the egg; second, the larva); and in fig. 4 the beetle, or perfect insect, is shown, in its fourth and last stage. The beetle

is quite small, its average length being one eighth of an inch, and its breadth one twelfth of an inch. In outline it is almost a perfect



ellipsoid, but its upper and lower surfaces are somewhat flattened. When captured, it folds up its antennæ and legs, and counterfeits death; and while lying motionless in this condition it is not readily recognized as an insect. Examined under an ordinary lens, it is beautiful in its contrasting colors of white, black, and scarlet. Its back is marked with a central red line at the junction of the wing covers, with the red extending from it in three places—at about the middle and at each end. On the outer border of the wing covers (elytra) are three irregular white spots nearly opposite the red ones, and the covers elsewhere are black. The under side of the body is clothed with pale pink scales. The peculiar markings and coloring of the beetle render it a conspicuous object, which will readily be recognized after having been once seen.—The larvæ may be found throughout the summer months, actively engaged in their depredations. Having attained their growth at the expense of a large amount of consumed carpet or other material, they retreat to some hidden crevice, where, ceasing to feed, they slowly contract in length until the formation of the pupa within the larval skin, when the latter splits open along the back, and through the fissure the pupa may be seen. In this condition it remains for a few weeks, when the pupal case also opens on the back, disclosing the brightly colored wing covers of the beetle. Several additional days of repose are required for the full development of the perfect insect, when it crawls out from its protective coverings of pupal case and larval skin, and enters upon its active stage, seeking its mates, and providing for the continuation of the species. The earliest beetles make their appearance in October, and continue to emerge during the winter. Their greatest abundance within doors is during May. In April and May the beetles may often be found on the windows of infested rooms, to which they have been attracted by the light, or through which they may be attempting to escape in search of vegetable food. The eggs are deposited either upon or just beneath the edge of carpets near the walls. As soon as hatched, the young larvæ begin to feed upon the under surface of

the carpet. They usually confine their ravages to those portions nearer the walls, into which either irregular holes are eaten, or, more frequently, as the larvæ increase in size, a straight line is cut, following the joinings of the floor and often extending across an entire breadth of the carpeting. A favorite place of gathering for them is immediately around the tacks with which the carpets are nailed. The larva is remarkably active, and when search is made for it by raising a portion of the carpet border, it instinctively seeks refuge beneath the base board, if an opening is presented there. Its peculiar armature of hairs and its rapid motions render its capture no easy task. The beetle is a vegetable feeder, and frequents flowers, the pollen of which it eats. No list of its food plants can be given, but examples have been taken in midsummer upon the *spirea aruncus*. It will undoubtedly be found hereafter upon several of the flowers and blossoms which it visits in Europe, principally of the umbelliferous plants.—While this insect is chiefly known as a carpet destroyer, yet its depredations extend to other woollen fabrics. In a house which had been infested by it for at least three years, it had become almost ubiquitous, notwithstanding earnest efforts for its extirpation. Its exuvæ were encountered in trunks, boxes, tied-up packages, and drawers, beneath oil-cloths, and behind pictures hanging on the walls. A company of a dozen or more of the full-grown larvæ was discovered upon a paillasse, to which they had apparently resorted for their final transformation. Picture and curtain cords have been eaten by them. Several instances are recorded where carpets have been completely ruined, and entire wardrobes of winter clothing destroyed. In a residence which was closed for a year during the absence of the family in Europe, "they took complete possession, from the cellar to the attic, in every nook and crevice of the floors, under matting and carpets, and behind pictures, eating everything in their way." That this species has never been reported as a carpet pest in Europe, is doubtless owing to the rare use of carpets there during the season (the summer months) of its larval depredations. In the United States, where carpets are in general use and are regarded as a necessary comfort, it has found the food and the conditions specially adapted to its taste and habits. Though but a short time has elapsed, in all probability, since its introduction into the United States, it has attained an extended distribution. It is of common occurrence in several of the larger cities of New York, and has become so numerous in New Jersey as to be occasionally observed upon flowers; and in Boston its extraordinary increase and injurious activity have excited great alarm. According to Prof. Riley, examples of the beetle have been captured with sweeping nets from flowers in Oregon, California, and eastward in most of the intermediate states to the Atlantic

seaboard.—Various means of preventing the ravages of this pest have been recommended, but they have not been sufficiently tested to indicate the most efficient one. Filling the crevices of the floors for a distance of two feet from the base boards with soft tallow, and laying beneath the borders of the carpet a broad strip of tallowed paper, have been found serviceable. The application of benzine and kerosene oil may also be advantageously made, both as preventive and destructive agents, by pouring them into the crevices, and by packing the floor joinings and beneath the base boards with cotton saturated with these substances. Carpets left unnailed at their borders are much less liable to injury, while they offer ready means for the discovery of the first attack. Flowering plants which the beetles frequent for food during June, July, and August should be planted in gardens and lawns, and also introduced so far as practicable within dwellings, to attract them during the earlier months, and afford easy means for their capture and destruction. The windows of infested rooms should be examined daily during April and May, or so long as the beetles may be found upon them. According to some testimony, fresh and pure Dalmatian insect powder, brushed into the crevices and dusted upon the under surface of the carpet, has been found of service. The new insecticide, "London purple," a residuum of the aniline dyes, should prove at least equally efficient. The applications of pepper, camphor, tobacco, and carbolic acid have not been of service in repelling attack. For destroying the larvæ when they have become numerous, boiling-hot water may be employed on ground floors, and for upper floors hot flatirons applied to wet cloths placed upon the borders of the carpets may be used.

CATHERINA ARCHIPELAGO, the chain of islands extending from Cook's inlet westward to Kamtchatka, and including the Kadiak archipelago, the Semidi, Shumagin, and Sannakh groups, the Aleutian islands proper, and the Commander islands. It was named by the geographer Forster, in 1786, in honor of the Empress of Russia. See ALASKA and ALEUTIAN ISLANDS.

CATTLE PLAGUE. The origin of this distemper, like that of all contagious diseases, is obscure. There are indications of its existence in ancient times, and authentic records of its prevalence in Europe nearly 200 years ago. It has a permanent existence in the unfenced mountain regions of central and eastern Europe, and was first carried thence into domestic herds by the commissary operations of great wars. There were periodical ravages in northern France and other parts of central Europe from 1820 to 1840. It made its first appearance in Holland about 1830. Ten years later there was considerable importation of Dutch cattle into Great Britain and Ireland for the purpose of improving stock, and this infection made its appearance at Dublin in 1841, and

in the vicinity of London in 1842. Since that time there has been more or less trouble with it wherever there was a market for imported stock, while those centres of the cattle trade which rely on domestic breeds and sell the native product instead of buying foreign have been free from it. In England vigorous repressive measures have been employed. The plague was carried into northern Europe—Denmark, Sweden, and Norway—about 1847-'48, and was taken to South Africa from Holland in 1854, and to Australia from England in 1858. In these southern countries its ravages have been especially severe, and it has been found very difficult to deal with it, as a warm climate is favorable to its spread. The lung plague was first brought into the United States by means of a single cow bought from the captain of an English vessel by a milkman of Brooklyn, N. Y., in 1848, and the disease, as it now exists in this country, is traceable to that one case. An entirely separate infection was introduced into Massachusetts by an importation of Dutch cattle in 1859, but was dealt with so vigorously that in six years it was exterminated. The infected cattle first introduced consisted of four cows imported for a stock-farm, and, owing to insufficient understanding of the case and inadequate precautions, it was permitted to spread through the sale of calves. It was carried into several localities in Massachusetts and sent into New Hampshire. The introduction of diseased cattle into the latter state was stopped by proclamation and a vigorous slaughtering of herds in which the plague appeared, and in the spring of 1860 the legislature of Massachusetts adopted measures for the extirpation of the contagion, which were entirely successful. Commissioners were appointed, with authority to slaughter and pay for all herds in which the disease was known or suspected to exist. Besides the animals which died and those disposed of by the selectmen of infected towns, during a temporary suspension of the commission in 1863, 1,164 cattle were condemned to slaughter by the commissioners. The cost to the state was \$77,511.07, including \$10,000 spent by the towns during the suspension of the commission. Since then New England has been free from the plague, with the exception of occasional cases carried into Connecticut from New York. From the Brooklyn case of 1848 the infection has been continuous to this day. Its prevalence among cows fed from the refuse of distilleries led to the swill-milk excitement of some years ago, and it has been clearly shown that the diseased condition of some of those cattle was not due to their stabling or feeding, but to the contagion of the lung plague. Its spread was promoted by the practice of pasturing cattle promiscuously in open spaces made up of vacant lots in the outskirts of large cities. At an early day the infection was carried from Brooklyn through the dairy herds of New York, Jersey City, Newark, Elizabeth, New Brunswick,

and Trenton to Germantown and Philadelphia. It extended later to Baltimore, and thence to Georgetown and Alexandria. Its ravages have been confined chiefly to the seaboard, from Long Island to Virginia, and its extension has everywhere been due to the same cause, of the mingling of cattle in unenclosed lands near the cities. The spread has been toward the south, in consequence of a similarity of conditions surrounding cities in that direction which are within easy reach of each other. The disease has never spread north from New York beyond the immediately outlying districts of Westchester and Putnam counties. This immunity, both in that direction and to the west, is attributed to the absence of cities with open, outlying spaces, and the general use of separate enclosed pasture-grounds. Moreover, the current of the cattle traffic is almost wholly from the west, eastward over the lines of communication to New York. The virus of the lung plague is very persistent and active in a close atmosphere, and is greatly mitigated, if not destroyed, by exposure to the open air. It will sometimes develop after a considerable period of quiescence in close places, and is capable of being carried long distances in clothing or other material. It has been communicated by food upon which infected animals have breathed. Mortality from this disease, as well as facility of transmission, varies with climate, increasing with an increase of temperature, whether due to latitude or the season of the year. In France about 20 per cent. of the cattle exposed to the infection resisted it altogether, and 50 per cent. escaped death; but in South Africa it is no uncommon thing to lose the whole herd if it is once exposed. Losses in England vary from 50 to 60 per cent. The period of incubation of the germs after being taken into the system and before the earliest symptoms of the disease are manifested, is generally stated as from six to sixty days, but it has been known to extend to one hundred days, and even longer. The symptoms themselves vary in different countries, climates, and seasons, and even different breeds of cattle. Sometimes the disease shows itself abruptly and with great violence, and again it develops slowly and insidiously. It usually begins with a cough, at first slight, and noticed only at intervals. It may be heard only when the animal rises or drinks cold water. It is usually weak, short, and husky, but may be painful, and accompanied by arching of the back. As the disease advances, the animal grows dull and sluggish, is apt to be found lying alone, apart from the herd, eats and ruminates tardily and breathes more quickly; the hair, especially about the neck and shoulders, becomes erect and dry, the muzzle has intervals of dryness, the milk diminishes, the eyes lose their prominence and lustre, the eyelids and ears droop, the limbs and the roots of the horns become alternately hot and cold. By this time the diseased condition of the

lungs may be ascertained by percussion and auscultation, the breathing being accompanied by harsh, rasping sounds, and more or less exudation of mucus. As seen in America in winter, the violence generally attributed to the disease does not appear. The victims fall off rapidly in condition, show a high fever for a time, and the diseased portion of the lung becomes encysted as a dead mass. In the extreme heat of summer and in hot climates the breathing becomes short, rapid, and labored, and often each expiration is accompanied by a grunt. The nostrils become retracted, and the animal stands most of the time with feet apart, head extended, eyes prominent and glassy, back slightly raised, and is incapable of most of the normal functions of life. Where the disease takes the violent form, there is not only great mortality, but a rapid culmination, while the milder cases are slower and more prolonged.—The result of study extending over a considerable period is the belief that the lung plague is due to bacteria, which, being taken into the lungs by the breath, make their way through the delicate lining of the air-cells and multiply, destroying the integrity of the tissues and causing inflammation and exudation. Inoculation has been tried, with results of disputed value. Inoculation is generally made at the tip of the tail, where the connective tissue is scanty and the lymphatic system poorly developed. It causes a harmless swelling, and is believed to diminish at least the liability of the animal to the infection. It is also considered effective in reducing the liability to a fatal termination in case the lungs are attacked. The risks connected with inoculation are due to the fact that the real virus of the disease is used, and that the effect is the actual development of the disease, though localized and confined in its effects. A somewhat insidious danger arises from the fact that the infection is sometimes carried for a considerable period, and communicated by means of the encysted masses in the lungs of animals that have recovered. These sometimes continue for a year or more. Cases have been known of infection from inoculated cattle, and it is believed that a general resort to that preventive would simply spread the disease. The subject has been investigated by a commission of the Treasury department, whose report was submitted to congress in February, 1882. They found no evidence of its existence in New England, or west of the Alleghany mountains. At the time the examination was made "not a shadow of suspicion of lung plague could be thrown upon our western herds." After recounting the evidence on this point, the commission said: "We claim, therefore, with the utmost confidence, that up to the end of the year 1881 the lung plague of cattle has been confined to the vicinity of the eastern seaboard, extending from Putnam co., N. Y., to Fairfax or Prince William co., Va. Connecticut is sound, and North Carolina is sound, so

that at present the infection is confined to the states of New York, New Jersey, Delaware, Pennsylvania, Maryland, and Virginia, and the District of Columbia." The commission took the ground, however, that within the area described the plague is in no way disappearing, but they found the practice prevalent of killing animals and disposing of them for beef when the symptoms of the disease showed themselves. They also discovered that efforts to conceal its existence were common among the owners of dairy herds.

CEDAR CREEK, Battle of, an action fought in Shenandoah co., Va., Oct. 19, 1864, between the confederate forces commanded by Gen. Early and the federal forces under Gen. Sheridan. After defeating Early at Fisher's Hill, in September, and devastating the Shenandoah valley, Sheridan had placed his army, posted strongly on Cedar creek, between Strasburg and Middletown. Not anticipating any attack, he went to Washington on official business, leaving Gen. Wright in command. Early, having collected his defeated and somewhat scattered troops, and been reinforced by Kershaw's division and 600 cavalry from Lee's army, planned a surprise. At Fisher's hill, behind a thick belt of woods, he formed two columns for a simultaneous attack on both flanks of the federals, the right column consisting of the divisions of Gordon, Pegram, and Ramseur, and the left of those of Wharton and Kershaw. They moved at midnight of Oct. 18, following unfrequented paths, and at dawn of the 19th fell upon the flanks and rear of Sheridan's camp. The assault was furious, and the surprise complete. Many men were shot or bayoneted in their tents before they were half awake. Crook's corps was thrown into disorder, and fell back upon those of Wright and Emory, leaving many prisoners and guns to fall into the hands of the enemy. Emory's corps soon gave way in turn, and left several guns behind. The captured artillery was turned upon the fugitives, while the right column of the confederates continued its flank movement. Wright ordered a general retreat, which was covered by the sixth corps, under command of Ricketts, and the broken columns were brought to a stand a mile beyond Middletown. Meanwhile, Sheridan, who had slept at Winchester, learning of the battle, rode forward at great speed, and rallied the fugitives with the words, "Face the other way, boys! We are going back to our camp!" A new inspiration seized the troops. Regiments formed rapidly one after another, and early in the afternoon Sheridan's whole force was organized and moving upon the enemy. Another battle ensued; but the confederates, somewhat demoralized by plunder of the camps, were soon defeated, and retreated in wild confusion up the valley, leaving behind everything that could impede their flight. At night the federals occupied their old camps, and had regained all their guns and 30 of the

enemy's. Their loss, in killed, wounded, and missing, had been 5,764, of whom 1,400 were prisoners taken early in the day and sent at once to Richmond; that of the confederates, as nearly as can be ascertained, was about 3,100. Early's army was virtually destroyed, and there was no more fighting of any consequence in the Shenandoah valley.

CELLULOID, a combination of gun cotton or pyroxyline and camphor. Its successful manufacture and introduction have only been accomplished during the past 12 years, though it is claimed that celluloid, under a different name, was manufactured in England by A. Parkes as early as 1855. The product has received various names: celluloid, parkesine, parkesite, xylonine, and xylonite. Celluloid consists virtually of vegetable fibre, treated with certain acids under certain conditions, the resulting product being united with camphor and other suitable substances, so as to make it elastic and capable of being moulded in any form. It may be made opaque or transparent, and can be polished, sawed, stamped, carved, turned, and planed, and may be given almost any degree of hardness. In 1867 William H. Pierson obtained a patent for producing a plastic compound from vegetable fibres. To form a hydrocarbonaceous compound, he proposed to use copal varnish, India rubber, gutta percha, or any hydrocarbon or suitable substance that is soluble in alcohol, ether, &c.; and although he did not signalize camphor, his patent covers it. The fibre of cotton, flax, hemp, wood, &c., by his process is changed into a substance by the action of acids similar to gun cotton or pyroxyline. This product is then submitted to the action of alcohol, ether, &c., to fit it for combination with other substances, as well as for moulding. To diminish the combustibility of this, which might be called "collodion," it is mixed with mineral or vegetable powders. When the plastic compound is applied to surfaces, by evaporation it becomes a solid which may be condensed by mechanical pressure. The inventor claims the formation of articles of manufacture resembling stone, wood, whalebone, shell, horn, and other rigid and elastic articles, out of plastic or semi-soluble pyroxyline united with mineral or vegetable powders. In 1868 J. A. McClelland obtained a patent for a very similar product, to be used for dental plates and other purposes. To the collodion he adds a solution of gum copal or other resinous substances. To give the material greater density, he adds metallic oxides, and colors it as desired. To neutralize the combustible nature of the material, he adds a small quantity of phosphate of ammonia or of magnesia. The compound is dried by a gentle heat on a smooth, hard surface, the vapors of the solvents being conducted over to a still and condensed. The plates are then ground to a fine powder, when the compound can be worked into a massive solid material for dental plates, &c. This is accomplished by softening the powder

with alcohol and ether, and pressing it in moulds at a moderate heat, beginning at 100° F., and rising to 150°. A patent was issued to Charles A. Seely in 1868 for a compound of collodion and nitro-glucose. The compound is made by adding to one pound of gun cotton one eighth to four ounces of nitro-glucose, and dissolving the same in one gallon of a suitable solvent. After the solution is complete, the solvent is evaporated, and sheets of the compound obtained. To the collodion containing the nitro-glucose resinous coloring and other substances can be added to suit the kind of article required. Leander R. Streeter claims, in a patent granted to him in 1869, that the evaporation of the ether from the above-mentioned compounds leaves the product with a cellular structure, and therefore it is not homogeneous. To obviate this difficulty, the product can be immersed in alcohol or other non-solvent of pyroxyline for from ten to fifteen hours, when it softens, and by the evaporation of the fluid by a heat not exceeding 220° F. a more homogeneous compound is produced. The pyroxyline may also be disintegrated and then immersed in alcohol or sulphide of carbon, &c., for from ten to fifteen hours, when a cementative body can be intermixed. A compound formed by combining with collodion ivory dust, in heated moulds under powerful pressure, was patented by John W. Hyatt, Jr., and David Blake in 1869.—Mr. Streeter very accurately says that there are serious difficulties arising from most of the products made from pyroxyline, which limit the large extension of these remarkable and valuable materials into articles of manufacture; these are, their powerful shrinkage, the exceeding volatility of the ethereal solvents, and the absolute non-adhesibility of their dried surfaces, upon which heat has no material softening effect. These difficulties in the direct action of a solvent must continue until some more manageable menstruum is found. Daniel Spill, of Hackney, England, was the first who fully comprehended these difficulties, and he patented in this country in 1869 an "improvement in compounds containing xyloidine." The invention consists in dissolving xyloidine (the product which results from the action of a mixture of sulphuric and nitric acid upon ligneous or vegetable fibre) in a solution of camphor in oil, united at an elevated temperature. The mixture or compound thus resulting is then masticated, either by the employment of rolls or masticators, by the application of heat. The compound may be employed direct, or it may be further incorporated with pigments, or with metallic, mineral, or vegetable or fibrous materials as diluents. The consistence of the material is dependent on the proportions of the several ingredients employed. One year later, Spill obtained another patent for a simple process of converting ligneous and vegetable fibre into xyloidine, for bleaching xyloidine, for coloring the same, for improvements in preparing xyloidine for

spreading on surfaces in a semi-fluid condition, and for preparing xyloidine suitable for the production of solid articles. The merits of the xyloidine products made by Spill were evidently due to the use of camphor, and although it is not united with the xyloidine or pyroxyline in the same manner as it is united to-day in the manufacture of celluloid, still the same object was accomplished; and to Spill, who first signalized camphor as the proper substance to use, should be given the credit, although, as already stated, Pierson's patent theoretically covers it.—In July, 1870, J. W. Hyatt, Jr., and I. S. Hyatt obtained a patent for an improvement in treating and moulding pyroxyline. The product obtained was not denominated "celluloid" in this patent, but received this name shortly afterward. Pyroxyline (see EXPLOSIVES) is prepared by grinding it in water until it is reduced to a fine pulp, by means of a machine similar to those employed in grinding paper pulp. Any pigment or dye, when desired, is then mixed and thoroughly ground with the pyroxyline pulp, or any powdered or granulated material is incorporated that may be adapted to the purpose of the manufacture. While the ground pulp is still wet it is mixed with finely pulverized gum camphor, in about the proportions of one part by weight of the camphor to two parts of the pyroxyline when in a dry state. These proportions may be somewhat varied with good results. The gum camphor may be comminuted by grinding in water, pounding, or rolling; or, if preferred, the camphor may be dissolved in alcohol or spirits of wine and then precipitated by adding water, the alcohol leaving the camphor and uniting with the water, when both the alcohol and the water may be drawn off, leaving the camphor in a very finely divided state. After the powdered camphor is thoroughly mixed with the wet pyroxyline pulp and the other ingredients, the water is expelled as far as possible by straining the mixture and subjecting it to an immense pressure in a perforated vessel. This leaves the mixture in a comparatively solid and dry state, but containing sufficient moisture to prevent the pyroxyline from burning or exploding during the remaining process. The mixture is then placed in a mould, which is heated to from 150° to 300° F., to suit the proportion of camphor and the size of the mass, and is subjected to a heavy pressure. The heat, according to the degree used, vaporizes or liquefies the camphor, and thus converts it into a solvent of the pyroxyline. By introducing the solvent in the manner here described, and using heat to make the solvent active, and pressure to force it into intimate contact with every particle of the pyroxyline, a less proportion of the solvent which depends upon heat for its activity can be used than has been known heretofore. After keeping the mixture under heat and pressure long enough to complete the solvent action throughout the mass, it is cooled while still under pressure, and then taken out

of the mould. The product is a solid of about the consistence of sole leather, which subsequently becomes as hard as horn or bone by the evaporation of the camphor. Before the camphor is evaporated, the material is easily softened by heat, and may be moulded into any desirable form, which neither changes nor appreciably shrinks in hardening. The pyroxyline and solvent, with or without other ingredients, are placed in a converting or stuffing cylinder, when water is let into the upper end of the engine, which causes the piston and follower to descend slowly, the supply pipes being made small for the purpose, so as to allow sufficient time for the heating of the contents of the cylinder, and the conversion or softening thereof before it is forced therefrom. A water jacket keeps the material cool until it has been compressed into the lower portion of the cylinder and the air allowed to escape. In the lower portion of the cylinder the heat from the steam jacket melts and renders active the solvent of the pyroxyline, or redissolves and agglomerates the scraps of the previously converted material, when the contents are gradually forced through the annular space around a core among pins, which thoroughly divides and mixes up the mass and brings every portion of it in contact with the heated surface of the cylinder, core, or pins, thereby insuring a complete transformation and a homogeneous compound. The celluloid is now forced through the discharge nozzle into a pipe mould, maintained at suitable and equable temperature, from which it may be discharged, when desired, in the form of a bar, sheet, or stick, according to the shape of the bore of the pipe. Instead of forming the celluloid into bars, rods, &c., as above described, the material may be forced from the discharge pipe or nozzle directly into a mould of the form of the article required to be produced.—A further improvement in the manufacture of celluloid, patented in 1874, consists in altering the proportions to about 100 parts of dry pyroxyline and from 25 to 40 parts of gum camphor (varying with the consistence required in the finished product), together with such coloring or other material as may be desired. When these ingredients are thoroughly intermixed, and the water expelled, from 20 to 40 per cent. of alcohol is added, and the whole mass kept within a closed vessel until the alcohol is evenly diffused through all its parts. After this even diffusion the mass is well masticated between rollers heated to 135° F. The particles of pyroxyline and other materials, such as coloring matter, are brought intimately in contact with the camphor by the action of the alcohol, when the mastication and semi-transformation take place, and the material is in a better condition for the final heating and converting process, so that from 50° to 75° less heat is required to complete the transformation of the pyroxyline and solvents into celluloid than is required when no alcohol is used. Nitrous

ether and other solvents of gum camphor may be substituted for alcohol in this process.—The Messrs. Hyatt obtained another patent in 1874 for a particular method of moulding celluloid, as also pyroxyline, &c. Owing to the inflammable nature of the pyroxyline, a special manipulation is required. The first part of the new invention consists in subjecting the material, in porous or other suitable moulds, to the direct action of steam, which not only heats and softens the mass with great facility, but, by excluding the heated air therefrom, and immersing the material in steam, diminishes to a great degree the liability to combustion, while it absorbs more or less of the volatile solvents remaining in the material. The second part of the invention consists in moulding celluloid and the compounds of pyroxyline in a closed vessel, supplied with steam, in contact with the moulds and material, and provided with a safety valve, so adjusted as to regulate automatically the pressure and temperature within the vessel, thereby dispensing with the use of a thermometer, and preventing the overheating of the material, and also preventing the bursting of the vessel, in case combustion should ensue, by the means provided for the escape of the gases. The third part consists in the combination with the vessel in which the moulds are placed of a heater arranged under it, and provided with an open receptacle for the heating liquid and apertures for the admission of air to support combustion. For moulding celluloid, the temperature will range between 212° and 300° F., and consequently it requires a pressure varying from that of the atmosphere to 64 lbs. above. The temperature of course is dependent upon the quality and condition of the material. The more thoroughly seasoned or dried the material, the greater the temperature required.—The manufacture of sheets from celluloid has been somewhat difficult; for when celluloid is secured upon a surface, and then fed to a fixed cutting edge, the material is apt to rise from the surface supporting it and ride up the knife. John W. Hyatt obtained a patent in 1878 for an improvement in the manufacture of sheets of celluloid which overcomes these difficulties. Several slabs or pieces of celluloid are first united by means of pressure and heat, which contemporaneously amalgamate the pieces into one slab, and also force portions of the under side thereof into channels or inclined grooves in the surface upon which the slab rests, which grooves are so arranged that upon the hardening and shrinking of the material the portions of it in the grooves operate as a series of hooks or clutches to retain the slab in place; after which the plate supporting the slab is placed upon a machine for planing, by which the material is shaved or planed off in sheets or pieces of any desired thickness, according to the capacity of the machine, the sheets being subsequently dried in open frames, whereby they acquire and retain formation. In the

same year Mr. Hyatt obtained another patent for the manufacture of sheets from celluloid. This invention consists in affixing a cylindrical body of celluloid rigidly upon a core, to the end that the cylinder thus formed may be subsequently submitted to the action of a knife as it is turned, which shall reduce it into thin strips or sheets.—*Manufacture.* At present all the celluloid used in this country is made at Newark, N. J., by one company, who make only the raw material, which is sold to various manufacturing companies for so much per pound and a royalty on their net sales. A license is given only for the purpose of making some new article that will not interfere with the trade of the companies already licensed. The cost of the crude article to the buyers is regulated by the producing company according to the use to be made of it and the competition met with in other materials. For instance, \$4 to \$5 a pound is charged for celluloid which is to be made into jewelry, while only \$2 is charged if it is designed for umbrella handles, though there is no difference in the quality of the substance. In consequence of this system, there is a similar wide variation in the cost of the manufactured articles. The celluloid company of Newark has branches in London and Paris, where the business is carried on extensively. There is a large export trade in celluloid articles to Cuba and South America, which is constantly increasing.—*Uses.* The uses that celluloid is put to in the arts are very numerous. As a close imitation of ivory, celluloid has made great inroads in the business of the ivory manufacturers. Great quantities are used for piano and organ keys, to the manufacture of which one company is devoted. Billiard balls are made of celluloid at half the price of ivory, and are said to be equally elastic and very durable. Large amounts are used for combs of every variety, for the backs of brushes and hand mirrors, and for all kinds of toilet articles which ivory is employed for. Even a fine-toothed comb made of celluloid is 25 per cent. cheaper than ivory, while in large pieces, such as the backs of hand glasses, the difference in price is much greater. Celluloid takes the place of ivory or India rubber in whip, cane, and umbrella handles, every kind of harness trimming, foot rules, chess men, and the handles of knives and forks. For pencil cases, jewelry, &c., it has an advantage over India rubber in not tarnishing the metal. Its application for dental blanks and other attachments of artificial teeth is quite extensive. Celluloid can be mottled so as to imitate the finest tortoise shell, and its elasticity renders it much less liable to breakage. It can be so colored as to imitate malachite and amber. It is made into mouthpieces for pipes, cigar-holders, musical instruments, drum sticks, drum heads, dolls' heads, jewelry, frames of spectacles, eyeglasses and opera glasses, shoe tips, cuffs, collars, hat bands, insoles, thimbles, emery wheels, knife-sharpeners, and many other articles. It

is equal to ivory as a ground for painting, and excellent photographs can be taken on it. There are no fewer than 90 patents referring to the celluloid industry.

CENSUS, UNITED STATES. The tenth decennial census of the United States, taken in 1880, is the most comprehensive census ever made in any country. It was taken under the act of congress of March 3, 1879, as amended by the act of April 20, 1880. By this legislation the law of 1850, under which the seventh, eighth, and ninth censuses were taken, is repealed, except that the schedules used in 1870 are retained, with modifications and additions. Under the old law, the enumeration was made by United States marshals, and the national judicial districts of the United States were made census districts. By the new law this duty was given to 150 census supervisors appointed by the president and senate, and census districts were specially created, without reference to judicial districts. The former law allowed the enumeration of inhabitants to be protracted through about a hundred days. The new law required the enumeration begun on June 1 to be completed within two weeks in all cities having by the census of 1870 more than 10,000 inhabitants, and before July 1 in all other places. To the schedule of personal inquiries made in 1870 were added in 1880 inquiries to show the relation of every person enumerated to the head of the family, whether wife, son, daughter, servant, boarder, or other; the civil condition of each, whether married, widowed, or single; the physical and mental health of each, whether active or disabled, maimed, crippled, or bed-ridden, whether employed or unemployed, and if unemployed, during what part of the year; and the place of birth of parents. The inquiries in the old schedule as to the value of real and personal property owned by each person were stricken out. Inquiries were added to show the acreage of crops and the indebtedness of cities, counties, incorporated villages, towns, and school districts. The census of 1880 gives for the first time comprehensive statistics showing the financial condition, property, business operations, &c., of all railroad, express, telegraph, and insurance companies in the United States. To obtain more accurate statistics of mortality, provision was made for using the official records of deaths in cities where such records are kept. The superintendent of the census was required to collect information concerning the ownership of the public debt of the United States, and was authorized to employ experts and special agents "to investigate in their economic relations" the statistics of manufacturing, fishing, mining, and other industries of the country, and the statistics of railroad, telegraph, express, transportation, and insurance companies. The census was taken for June 1, 1880, and was intended to show the population and condition of the country on that day. When statistics for the year are given, they are for the

twelve months ending May 31, 1880.—The results of the census of 1870 were published in three quarto volumes: I. Population and Social Statistics; II. Vital Statistics; III. Industry and Wealth. The returns of 1880 will fill fifteen quarto volumes, aggregating more than fifteen thousand pages. This difference in bulk between the prepared matter of the two censuses is due partly to the fact that the statistics gathered in 1880 are more comprehensive than those of 1870, but chiefly to the preparation by experts of many elaborate reports on special industries and statistics returned in 1880. An act of August 7, 1882, authorized the publication of additional copies of the reports of the tenth census as follows: complete set, 10,000; report on population, 20,000; agriculture, 20,000; manufactures and mechanics, 10,000; compendium, 100,000. Provision is made for distribution by the secretary of the interior to libraries, public institutions, and persons named by senators and representatives in congress. The same act orders the publication of 6,000 copies of the report on the history of the national loan, for the use of the treasury department, and 1,500 copies of the report on fish and fisheries, for the fish commission. Francis A. Walker, superintendent of the ninth census, was appointed superintendent of the tenth. He resigned in October, 1881, and was succeeded by Charles W. Seaton.—The total population of the United States, as returned by the census of 1880, is 50,155,783. This aggregate is composed as follows: male,

25,518,820; female, 24,636,963; native, 43,475,840; foreign, 6,679,943; white, 43,402,970; colored, 6,580,793; Chinese, 105,465; Japanese, 148; civilized Indians, 66,407. The number of males 21 years of age and upward was 12,830,349. Of these, 11,343,005 were white, and 1,487,344 were colored, including Chinese, Japanese, and Indians. Of the white, 8,270,518 were native- and 3,072,487 foreign-born. Of males of military age, 18 to 44 years, both inclusive, there were 10,231,239. In 1870 the aggregate population was 38,558,371. There were then 19,493,565 males, 19,064,806 females, 32,991,142 native-born, 5,567,229 foreign-born, 33,589,377 whites, 4,880,009 colored, 63,199 Chinese, 55 Japanese, and 25,731 civilized Indians—that is, Indians out of tribal relations. There were 9,439,206 males 21 years old and upward, including 8,353,719 white and 1,085,487 colored. The white males were divided into 6,896,623 native- and 2,542,583 foreign-born. The centre of population of the United States in 1880 was 8 miles west by south of Cincinnati, Ohio; in 1870 it was 48 miles east by north of that city. In 1880 there were in the United States 9,945,916 families and 8,955,812 dwellings. The number of families to a square mile was 3.43; number of persons to a square mile, 17.29. The average number of persons to a family was 5.04; of persons to a dwelling, 5.60. The following table shows the population for 1880 in each state and territory, in the aggregate, and by nativity and race:

STATES.	Total.	Native.	Foreign.	White.	Colored.	Chinese.	Japanese.	Indians.
Alabama.....	1,262,505	1,252,771	9,734	662,185	600,103	4	.....	213
Arkansas.....	802,525	792,175	10,350	591,531	210,666	133	.....	195
California.....	864,694	571,520	292,874	767,181	6,018	75,132	86	16,277
Colorado.....	194,327	154,537	39,790	191,126	2,435	612	.....	154
Connecticut.....	622,700	492,708	129,992	610,769	11,547	123	6	255
Delaware.....	146,608	137,140	9,468	129,160	26,442	1	.....	5
Florida.....	269,498	259,584	9,909	142,605	126,690	18	.....	180
Georgia.....	1,542,180	1,531,616	10,564	816,906	725,133	17	.....	124
Illinois.....	3,077,871	2,434,295	533,576	3,031,151	46,365	209	8	140
Indiana.....	1,978,301	1,834,123	144,178	1,938,798	39,228	29	.....	246
Iowa.....	1,624,615	1,362,965	261,650	1,614,600	9,516	38	.....	466
Kansas.....	996,096	856,010	110,086	952,155	43,107	19	.....	815
Kentucky.....	1,648,690	1,589,173	59,517	1,377,179	271,451	10	.....	50
Louisiana.....	939,946	855,800	54,146	454,954	433,655	489	.....	848
Maine.....	648,936	500,053	58,883	646,852	1,451	8	.....	625
Maryland.....	934,943	852,137	82,806	724,693	210,289	5	.....	15
Massachusetts.....	1,788,085	1,389,594	448,491	1,703,782	18,697	229	8	369
Michigan.....	1,636,937	1,248,429	388,508	1,614,560	15,100	27	1	7,249
Minnesota.....	780,773	518,097	267,676	776,884	1,564	24	1	2,300
Mississippi.....	1,131,597	1,122,338	9,259	479,393	650,291	51	.....	1,857
Missouri.....	2,163,330	1,956,802	211,528	2,022,526	145,350	91	.....	113
Nebraska.....	452,402	354,988	97,414	449,764	2,335	18	.....	235
Nevada.....	62,266	26,613	25,635	53,556	483	5,416	3	2,803
New Hampshire.....	346,991	300,697	46,294	346,229	685	14	.....	63
New Jersey.....	1,311,116	909,416	221,700	1,092,017	33,853	170	2	74
New York.....	5,083,571	3,871,492	1,211,379	5,016,922	65,104	909	17	519
North Carolina.....	1,399,750	1,396,008	3,742	867,242	531,277	.....	1	1,230
Ohio.....	3,198,062	2,803,119	394,943	3,117,920	79,900	103	8	130
Oregon.....	174,765	144,265	30,503	163,075	487	9,510	2	1,694
Pennsylvania.....	4,283,591	3,695,062	588,529	4,197,016	85,535	148	8	184
Rhode Island.....	276,531	202,536	73,993	269,939	6,488	27	.....	77
South Carolina.....	995,577	987,591	7,986	391,105	604,332	9	.....	131
Tennessee.....	1,542,359	1,525,657	16,702	1,138,591	403,151	25	.....	352
Texas.....	1,591,749	1,477,133	114,616	1,197,237	393,384	136	.....	992
Vermont.....	332,256	291,327	40,929	331,218	1,067	.....	.....	11
Virginia.....	1,512,565	1,497,569	14,996	884,858	631,067	6	.....	85
West Virginia.....	618,457	600,192	18,265	592,337	25,886	5	.....	29
Wisconsin.....	1,315,497	910,072	405,425	1,309,618	2,702	16	.....	3,161
The states.....	49,371,340	42,871,556	6,499,784	42,714,479	6,518,372	93,782	141	44,566

TERRITORIES.	Total.	Native.	Foreign.	White.	Colored.	Chinese.	Japanese.	Indians.
Arizona.....	40,440	24,391	16,049	85,160	155	1,680	2	8,493
Dakota.....	185,177	83,382	51,795	133,147	401	238	.....	1,391
District of Columbia..	177,624	160,502	17,122	118,006	59,596	13	4	5
Idaho.....	82,610	22,686	9,974	29,013	58	8,379	.....	165
Montana.....	89,159	27,688	11,621	35,385	846	1,765	.....	1,663
New Mexico.....	119,565	111,514	8,051	108,721	1,015	57	.....	9,772
Utah.....	143,963	99,969	43,994	142,423	232	501	.....	807
Washington.....	75,116	59,313	15,803	67,199	825	3,186	1	4,405
Wyoming.....	20,789	14,939	5,850	19,487	298	914	.....	140
The territories.....	754,443	604,284	150,159	683,491	62,421	11,683	7	21,841
The United States.	50,155,783	43,475,840	6,679,943	43,402,970	6,580,793	105,465	143	66,407

The population of the 100 largest cities in 1880 is given below. The list includes all cities having 20,000 inhabitants or upward, and shows the population of the same places in 1870:

CITIES.	States.	POPULATION.	
		1880.	1870.
Albany.....	New York.....	90,758	69,422
Allegheny.....	Pennsylvania.....	73,682	53,180
Atlanta.....	Georgia.....	37,409	21,759
Auburn.....	New York.....	21,924	17,225
Augusta.....	Georgia.....	21,891	15,859
Baltimore.....	Maryland.....	382,313	267,354
Bay City.....	Michigan.....	20,693	7,064
Boston.....	Massachusetts.....	362,889	250,526
Bridgeport.....	Connecticut.....	27,643	18,969
Brooklyn.....	New York.....	566,663	396,099
Buffalo.....	New York.....	155,134	117,714
Cambridge.....	Massachusetts.....	52,669	39,634
Camden.....	New Jersey.....	41,659	20,045
Charleston.....	South Carolina.....	49,984	48,956
Chelsea.....	Massachusetts.....	21,782	18,547
Chicago.....	Illinois.....	503,185	298,977
Cincinnati.....	Ohio.....	255,139	216,239
Cleveland.....	Ohio.....	160,146	92,829
Columbus.....	Ohio.....	51,647	31,274
Covington.....	Kentucky.....	23,720	24,505
Davenport.....	Iowa.....	21,331	20,038
Dayton.....	Ohio.....	35,673	30,473
Denver.....	Colorado.....	35,629	4,759
Des Moines.....	Iowa.....	22,408	12,035
Detroit.....	Michigan.....	116,340	79,577
Dubuque.....	Iowa.....	22,254	18,434
Elizabeth.....	New Jersey.....	28,229	20,532
Elmira.....	New York.....	20,541	15,868
Erie.....	Pennsylvania.....	27,737	19,646
Evansville.....	Indiana.....	29,250	21,830
Fall River.....	Massachusetts.....	48,961	26,766
Fort Wayne.....	Indiana.....	26,880	17,718
Galveston.....	Texas.....	22,248	18,818
Grand Rapids.....	Michigan.....	32,016	16,507
Harrisburg.....	Pennsylvania.....	30,762	23,104
Hartford.....	Connecticut.....	42,015	37,150
Hoboken.....	New Jersey.....	30,999	20,297
Holyoke.....	Massachusetts.....	21,915	10,738
Indianapolis.....	Indiana.....	75,056	48,244
Jersey City.....	New Jersey.....	120,722	82,546
Kansas City.....	Missouri.....	55,785	32,260
Lancaster.....	Pennsylvania.....	25,769	20,233
Lawrence.....	Massachusetts.....	39,151	28,921
Louisville.....	Kentucky.....	123,753	100,753
Lowell.....	Massachusetts.....	59,475	40,928
Lynn.....	Massachusetts.....	38,274	28,233
Manchester.....	New Hampshire.....	32,630	23,536
Memphis.....	Tennessee.....	33,592	40,226
Milwaukee.....	Wisconsin.....	115,587	71,440
Minneapolis.....	Minnesota.....	46,887	18,066
Mobile.....	Alabama.....	29,132	32,034
Nashville.....	Tennessee.....	49,350	25,865
Newark.....	New Jersey.....	136,508	105,059
New Bedford.....	Massachusetts.....	26,845	21,320
New Haven.....	Connecticut.....	62,882	50,840
New Orleans.....	Louisiana.....	216,090	191,418
Newport.....	Kentucky.....	20,438	15,037
New York.....	New York.....	1,206,299	942,292
Norfolk.....	Virginia.....	21,966	19,229
Oakland.....	California.....	34,555	10,500
Omaha.....	Nebraska.....	30,518	16,083
Oswego.....	New York.....	21,116	20,910

CITIES.	States.	POPULATION.	
		1880.	1870.
Paterson.....	New Jersey.....	51,031	33,579
Peoria.....	Illinois.....	29,259	22,849
Petersburg.....	Virginia.....	21,656	18,950
Philadelphia.....	Pennsylvania.....	847,170	674,022
Pittsburg.....	Pennsylvania.....	156,359	86,076
Portland.....	Maine.....	33,310	31,413
Poughkeepsie.....	New York.....	20,207	20,080
Providence.....	Rhode Island.....	104,857	68,904
Quincy.....	Illinois.....	27,263	24,052
Reading.....	Pennsylvania.....	43,278	33,930
Richmond.....	Virginia.....	63,000	51,033
Rochester.....	New York.....	59,266	62,386
Sacramento.....	California.....	21,420	16,283
St. Joseph.....	Missouri.....	32,431	19,565
St. Louis.....	Missouri.....	350,513	310,864
St. Paul.....	Minnesota.....	41,473	20,030
Salem.....	Massachusetts.....	27,563	24,117
Salt Lake City.....	Utah.....	20,798	12,554
San Antonio.....	Texas.....	20,530	12,256
San Francisco.....	California.....	233,559	149,473
Savannah.....	Georgia.....	30,709	28,235
Scranton.....	Pennsylvania.....	45,550	35,092
Somerville.....	Massachusetts.....	24,933	14,635
Springfield.....	Illinois.....	19,743	17,364
Springfield.....	Massachusetts.....	33,340	26,708
Springfield.....	Ohio.....	20,780	12,652
Syracuse.....	New York.....	51,792	43,051
Taunton.....	Massachusetts.....	21,213	18,629
Terre Haute.....	Indiana.....	26,042	16,103
Toledo.....	Ohio.....	50,137	31,584
Trenton.....	New Jersey.....	29,910	22,874
Troy.....	New York.....	56,747	46,465
Utica.....	New York.....	33,914	28,504
Washington.....	Dist. of Columbia.....	147,293	109,199
Wheeling.....	West Virginia.....	30,373	19,280
Wilkesbarre.....	Pennsylvania.....	23,339	10,174
Wilmington.....	Delaware.....	42,473	30,841
Worcester.....	Massachusetts.....	58,291	41,105

The number of persons in the United States in 1880 10 years of age and upward was 36,761,607. Of these, 4,923,451, or 13·4 per cent., were unable to read, and 6,239,958, or 17 per cent., could not write. The aggregate of those 10 years old and over comprised 32,160,400 white and 4,601,207 colored persons. The whites were divided into 25,785,789 native- and 6,374,611 foreign - born. The number of those unable to write included 9·4 per cent. of all the white, 3,019,080; 8·7 per cent. of the native white, 2,255,460; 12 per cent. of the foreign white, 763,620; and 70 per cent. of the colored, 3,220,878. The table on the next page shows the percentage in the United States and in each state and territory of all persons 10 years old and upward who were unable to read, and the percentage in the aggregate and by classes of those who were unable to write. The highest percentage of illiteracy was in New Mexico, where over 60 per cent. of all the inhabit-

ants were unable to read, and 65 per cent. were unable to write. The next in order was South Carolina, with over 48 per cent. of her entire population unable to read; next Louisiana, with nearly 46 per cent.; next Alabama, with over 43 per cent.; next Georgia, with almost 43. Of the states that have no population of freedmen, Rhode Island shows the highest percentage of illiteracy, 7.9; Iowa the lowest, 2.4.

STATES AND TERRITORIES.	Per cent. of all unable to read.	UNABLE TO WRITE.				
		Per cent. of all.	Per cent. of white.	Per cent. of native white.	Per cent. of foreignwhite.	Per cent. of colored.
Alabama.....	43.5	50.9	24.7	25.0	7.7	80.6
Arizona.....	16.7	17.7	16.8	8.1	26.8	23.7
Arkansas.....	28.8	38.0	25.0	25.5	5.6	75.0
California.....	7.1	7.8	4.4	2.0	8.6	29.8
Colorado.....	5.9	6.6	6.4	7.1	4.0	20.5
Connecticut.....	4.2	5.7	5.5	1.0	18.3	17.4
Dakota.....	3.1	4.8	4.2	1.8	6.8	44.2
Delaware.....	15.3	17.5	9.1	8.1	18.5	57.5
Dist. Columbia.....	15.7	18.8	4.3	2.6	12.1	48.4
Florida.....	33.0	48.4	19.9	20.7	10.0	70.7
Georgia.....	42.8	49.9	22.9	23.2	5.6	81.6
Idaho.....	5.5	7.1	3.6	3.0	5.8	28.2
Illinois.....	4.3	6.4	5.9	5.3	7.7	87.2
Indiana.....	4.8	7.5	7.0	6.8	8.9	85.6
Iowa.....	2.4	3.9	3.8	2.6	8.1	30.0
Kansas.....	3.6	5.6	3.7	3.1	6.7	46.8
Kentucky.....	22.2	29.9	22.0	22.8	9.7	70.4
Louisiana.....	45.8	49.1	18.4	19.8	10.9	79.1
Maine.....	3.5	4.3	4.2	1.9	28.7	24.8
Maryland.....	16.0	19.3	8.1	7.8	10.2	59.6
Massachusetts.....	5.3	6.5	6.4	0.7	19.6	15.1
Michigan.....	3.8	5.2	4.8	2.3	10.7	28.5
Minnesota.....	3.7	6.2	6.0	1.9	10.9	87.2
Mississippi.....	41.9	49.5	16.3	16.6	6.0	75.2
Missouri.....	8.9	13.4	10.5	11.1	7.0	53.9
Montana.....	4.8	5.3	2.2	1.4	3.8	85.8
Nebraska.....	2.5	3.6	3.5	2.3	6.4	30.7
Nevada.....	7.3	8.0	4.5	1.1	8.4	26.7
New Hampshire.....	4.2	5.0	5.0	1.1	26.9	15.8
New Jersey.....	4.5	6.2	5.3	3.2	11.1	30.5
New Mexico.....	60.2	65.0	62.2	64.2	43.3	92.2
New York.....	4.2	5.5	5.3	2.2	12.5	21.2
North Carolina.....	38.3	48.3	31.5	31.7	8.3	77.4
Ohio.....	3.6	5.5	4.9	4.3	8.4	27.3
Oregon.....	4.1	5.7	3.6	3.7	4.4	27.8
Pennsylvania.....	4.6	7.1	6.7	4.8	15.1	27.1
Rhode Island.....	7.9	11.2	10.9	2.9	27.3	23.6
South Carolina.....	48.2	55.4	21.9	22.4	4.9	78.5
Tennessee.....	27.7	38.7	27.3	27.8	7.5	71.7
Texas.....	24.1	29.7	15.3	13.9	24.7	75.4
Utah.....	5.0	9.1	8.5	5.9	11.8	52.3
Vermont.....	4.9	6.0	6.0	2.4	26.6	19.3
Virginia.....	34.0	40.6	18.2	18.5	5.4	73.7
Washington.....	5.7	7.0	2.9	2.4	4.5	33.1
West Virginia.....	12.1	19.9	18.3	18.6	13.5	55.0
Wisconsin.....	4.0	5.8	5.6	2.0	10.8	31.0
Wyoming.....	2.6	3.4	2.5	1.7	4.1	14.7
United States...	13.4	17.0	9.4	8.7	12.0	70.0

STATES AND TERRITORIES.	Gross area, sq. m.	Total water-sur- face.	Total land- surface.
Alabama.....	52,250	710	51,540
Arizona.....	113,020	100	112,920
Arkansas.....	53,850	805	53,045
California.....	158,360	2,850	155,980
Colorado.....	103,925	250	103,645
Connecticut.....	4,990	145	4,845
Dakota.....	149,100	1,400	147,700
Delaware.....	2,050	90	1,960
District of Columbia.....	70	10	60
Florida.....	58,680	4,440	54,240
Georgia.....	59,475	495	58,980
Idaho.....	84,840	510	84,290
Illinois.....	56,650	650	56,000
Indiana.....	36,850	440	35,910
Indian Territory.....	64,690	600	64,090
Iowa.....	56,025	550	55,475
Kansas.....	82,080	880	81,700
Kentucky.....	40,400	400	40,000
Louisiana.....	48,720	3,800	45,420
Maine.....	33,040	3,145	29,895
Maryland.....	12,210	2,350	9,860
Massachusetts.....	8,315	275	8,040
Michigan.....	58,915	1,485	57,480
Minnesota.....	89,365	4,160	79,205
Mississippi.....	46,810	470	46,340
Missouri.....	69,415	680	68,735
Montana.....	146,080	770	145,310
Nebraska.....	76,855	670	76,185
Nevada.....	110,700	960	109,740
New Hampshire.....	9,305	800	9,005
New Jersey.....	7,815	360	7,455
New Mexico.....	122,580	120	122,460
New York.....	49,170	1,550	47,620
North Carolina.....	52,250	3,670	48,580
Ohio.....	41,060	800	40,760
Oregon.....	96,080	1,470	94,560
Pennsylvania.....	45,215	230	44,985
Rhode Island.....	1,250	165	1,085
South Carolina.....	30,570	400	30,170
Tennessee.....	42,050	800	41,750
Texas.....	265,750	3,490	262,290
Utah.....	84,970	2,780	82,190
Vermont.....	9,565	480	9,185
Virginia.....	42,450	2,345	40,125
Washington Territory.....	69,180	2,300	66,880
West Virginia.....	24,780	185	24,645
Wisconsin.....	56,040	1,590	54,450
Wyoming.....	97,890	315	97,575
Unorganized territory.....	5,740	.....	5,740
Delaware Bay.....	620	620	.....
Raritan Bay and lower New York Bay.....	100	100	.....
Total.....	3,025,600	55,600	2,970,000

—The number of farms in the United States in 1880 was 4,008,907, of which 2,984,306 were occupied by the owners. The whole number in 1870 was 2,659,985. In the northern, western, and Pacific states there was a great increase in the number of farms during the decade, owing to the rapid settlement of those regions. There has also been a marked increase in the southern states, due to the subdivision of large plantations. Of the whole number returned in 1880, 781,474 contained between 20 and 50 acres, 1,032,910 between 50 and 100, 1,695,983 between 100 and 500, 75,972 between 500 and 1,000, and 23,578 contained 1,000 and over. The live stock on all farms in the United States on June 1, 1880, was 10,357,981 horses, 1,812,932 mules and asses, 993,970 working oxen, 12,443,593 milch cows, 22,488,590 other cattle, 35,191,656 sheep, and 47,683,951 swine. Ohio had 4,902,486 sheep, California 4,152,349, Texas 2,411,887, Michigan 2,189,389, and New Mexico 2,088,831. The census returns of cereals represent the crops for 1879. The acre-

—The areas of the United States and the several states and territories, as revised by the census bureau, are materially different from those before given. The total area of the United States as now returned is about 800 square miles less than that heretofore fixed. It was given in the census of 1870 at 3,026,494 square miles, exclusive of the 577,390 square miles of Alaska. It is now found to be 3,025,600 square miles, exclusive of Alaska. The newly reported area of every state and territory is different from the old, and in many cases the difference is great. The census returns of areas in 1880, which do not include Alaska, are as follows:

age is now reported for the first time. The figures for the United States show that 1,997,717 acres were planted with barley, 848,389 with buckwheat, 62,368,869 with Indian corn, 16,144,593 with oats, 1,842,303 with rye, and 35,430,052 with wheat. The yield of 1869, as

reported by the census of 1870, was: barley, 29,761,305 bushels; buckwheat, 9,821,721; Indian corn, 760,944,549; oats, 282,107,157; rye, 16,918,795; wheat, 287,745,626. The following table shows the production of cereals in 1879:

STATES AND TERRITORIES.	Barley.	Buckwheat.	Indian corn.		Oats.	Rye.	Wheat.	
	Bushels.	Bushels.	Acres.	Bushels.	Bushels.	Bushels.	Acres.	Bushels.
Alabama.....	5,231	363	2,055,929	25,451,278	3,039,639	28,402	264,971	1,529,657
Arizona.....	239,051	...	1,818	34,746	564	.....	9,026	186,427
Arkansas.....	1,952	548	1,295,310	24,156,417	2,219,822	22,387	204,084	1,269,715
California.....	12,463,561	22,307	71,781	1,993,325	1,341,271	181,681	1,332,429	29,017,707
Colorado.....	107,116	110	22,991	455,968	640,900	19,465	64,638	1,425,014
Connecticut.....	12,256	137,563	55,796	1,880,421	1,009,706	370,733	2,198	38,742
Dakota.....	277,424	2,521	90,852	2,000,864	2,217,132	24,359	265,298	2,530,259
Delaware.....	523	5,857	202,120	3,594,264	378,508	5,953	87,539	1,175,272
Dist. of Columbia	.....	1,032	.....	29,750	7,440	3,704	284	6,402
Florida.....	210	.....	360,294	3,174,234	468,112	2,965	81	422
Georgia.....	18,662	402	2,538,733	23,202,018	5,548,743	101,716	475,634	3,159,771
Idaho.....	274,750	.....	569	16,408	462,236	4,341	22,066	540,589
Illinois.....	1,229,523	178,559	9,019,381	325,792,481	63,189,200	3,121,785	3,218,542	51,110,502
Indiana.....	882,835	89,707	3,675,420	115,482,300	15,599,518	303,105	2,619,695	47,284,353
Iowa.....	4,022,588	166,895	6,616,144	275,014,247	50,610,591	1,518,605	8,049,288	31,154,205
Kansas.....	809,273	24,421	3,417,817	105,729,325	8,180,385	413,181	1,861,402	17,324,141
Kentucky.....	436,326	9,942	3,021,176	72,852,263	4,530,738	665,050	1,160,108	11,356,113
Louisiana.....	.....	.....	742,728	9,839,689	229,840	1,013	1,501	6,034
Maine.....	242,185	852,701	30,997	960,633	2,265,575	26,398	43,229	665,714
Maryland.....	6,097	136,667	664,928	15,963,533	1,794,372	288,067	569,296	8,004,864
Massachusetts.....	80,123	67,117	52,555	1,797,768	645,159	213,716	963	15,763
Michigan.....	1,204,816	413,062	919,656	32,461,452	18,190,793	294,918	1,822,749	35,532,543
Minnesota.....	2,972,965	41,756	493,737	14,831,741	28,852,153	215,245	8,044,670	34,601,030
Mississippi.....	848	.....	1,570,550	21,840,800	1,950,620	5,134	43,524	213,590
Missouri.....	123,031	57,640	5,538,265	202,414,413	20,670,958	535,426	2,074,394	24,966,627
Montana.....	39,970	437	197	5,649	900,915	430	1,665	469,683
Nebraska.....	1,744,656	17,562	1,630,660	65,450,135	6,555,875	424,348	1,469,365	13,847,007
Nevada.....	513,470	.....	487	12,891	186,860	.....	3,674	69,298
New Hampshire.....	87,577	94,090	36,612	1,350,243	1,017,620	34,638	11,413	169,316
New Jersey.....	4,091	466,414	344,555	11,150,705	3,710,573	949,064	149,760	1,901,739
New Mexico.....	50,053	.....	41,449	633,736	156,527	240	51,230	706,641
New York.....	7,792,062	4,461,200	779,272	25,690,156	37,575,506	2,634,690	736,611	11,587,766
North Carolina.....	2,421	44,663	2,805,419	28,019,839	3,333,063	285,160	646,829	3,897,393
Ohio.....	1,707,129	280,229	3,251,923	111,877,124	23,664,505	339,221	2,556,134	46,014,869
Oregon.....	920,977	6,215	5,646	126,862	4,355,650	15,305	445,077	7,450,010
Pennsylvania.....	498,100	3,593,326	1,373,270	45,821,531	33,341,439	3,683,621	1,445,384	19,462,405
Rhode Island.....	17,733	1,254	11,893	372,967	159,339	12,997	17	240
South Carolina.....	16,257	.....	1,303,404	11,767,099	2,715,505	27,049	170,902	962,353
Tennessee.....	80,019	33,434	2,904,873	62,764,429	4,722,190	156,419	1,196,563	7,331,358
Texas.....	72,786	535	2,465,587	29,065,172	4,593,359	25,399	873,570	2,567,737
Utah.....	217,140	.....	12,007	163,342	418,082	9,605	72,542	1,169,199
Vermont.....	267,625	356,618	55,249	2,014,271	3,742,282	71,733	20,748	387,257
Virginia.....	14,223	186,004	1,708,127	29,119,761	5,833,181	824,481	901,177	7,826,214
Washington.....	565,537	2,498	2,117	39,153	1,571,706	7,124	81,354	1,921,322
West Virginia.....	9,740	255,298	565,785	14,090,609	1,908,505	113,181	393,068	4,001,711
Wisconsin.....	5,043,118	299,107	1,013,393	34,230,579	32,905,320	2,295,513	1,948,100	24,834,689
Wyoming.....	.....	.....	.....	.....	22,512	78	241	4,674
United States..	43,997,495	11,817,327	62,368,504	1,754,591,676	407,858,999	19,331,595	35,430,338	459,483,137

The wheat crop of 1882, as estimated by the department of agriculture, was about 500,000,000 bushels; the yield of Indian corn was about 1,680,000,000 bushels. The production of cotton in 1879, in bales averaging 475 pounds each, was:

STATES.	Acres.	Bales.	Bales per acre.
Alabama.....	2,330,086	699,654	0.30
Arkansas.....	1,042,976	608,256	0.58
Florida.....	245,595	54,997	0.22
Georgia.....	2,617,133	514,441	0.31
Indian Territory.....	35,000	17,000	0.49
Kentucky.....	2,667	1,367	0.51
Louisiana.....	864,737	508,569	0.59
Mississippi.....	2,106,215	963,111	.....
Missouri.....	32,116	20,318	0.63
North Carolina.....	893,153	389,598	0.44
South Carolina.....	1,364,249	522,548	0.38
Tennessee.....	722,562	330,621	0.46
Texas.....	2,178,435	805,284	.....
Virginia.....	45,400	19,595	0.44
Total United States.	14,480,019	2,755,359	0.40

The total yield of cotton seed was 2,725,197 tons, and of lint, 1,362,599 tons. According to carefully prepared commercial statistics, the cotton crop of the United States was 6,589,329 bales of 485-88 pounds each in 1880-'81, and 5,435,845 bales of 475-67 pounds each in 1881-'82. The number of acres of sugar cane planted, and the number of hogsheads of sugar and gallons of molasses produced in 1879, as returned at the census of 1880, were:

STATES.	Acres.	Sugar (hogsheads).	Molasses (gallons).
Alabama.....	6,627	94	795,199
Florida.....	7,938	1,273	1,029,868
Georgia.....	15,053	601	1,565,784
Louisiana.....	181,592	171,706	11,636,248
Mississippi.....	4,555	18	536,625
South Carolina.....	1,737	229	188,944
Texas.....	10,224	4,951	810,605
Total.....	227,776	173,872	16,573,278

The production of rice was:

STATES.	Acres.	Pounds.	Average yield per acre (pounds).
Alabama.....	1,579	810,889	514
Florida.....	2,551	1,294,677	508
Georgia.....	84,973	25,369,687	725
Louisiana.....	42,000	23,188,311	552
Mississippi.....	3,501	1,718,951	491
North Carolina.....	10,846	5,609,191	517
South Carolina.....	73,838	52,077,515	664
Texas.....	895	62,152	186
Total.....	174,178	110,181,873	632

The number of acres in the United States planted in tobacco was 638,841; pounds raised, 472,661,157. The chief tobacco-growing states are: Kentucky, which produced 171,120,784 pounds; Virginia, 79,988,868; Pennsylvania, 36,943,272; Ohio, 34,735,235; Tennessee, 29,365,052; North Carolina, 26,986,213; Maryland, 26,082,147; Connecticut, 14,044,652; Missouri, 12,015,657; Wisconsin, 10,608,423; and Indiana, 8,872,842.—The following table contains the statistics for all the establishments of manufacturing industry, gas excepted, in each of the states and territories:

STATES AND TERRITORIES.	Number of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youth.			
Alabama.....	2,070	\$9,668,008	8,368	842	809	\$2,500,504	\$8,545,520	\$13,565,504
Arizona.....	66	272,600	216	2	2	111,180	880,023	618,365
Arkansas.....	1,902	2,993,180	4,307	90	160	925,858	4,392,080	6,756,159
California.....	5,885	61,243,784	38,311	3,922	1,460	21,065,905	72,607,709	116,218,973
Colorado.....	599	4,311,714	4,652	266	156	2,614,427	8,806,762	14,260,159
Connecticut.....	4,488	120,480,275	75,619	28,851	8,445	43,501,518	102,183,841	155,697,211
Dakota.....	251	771,428	854	8	6	339,375	1,223,761	2,873,970
Delaware.....	746	15,655,822	10,250	1,426	962	4,267,349	12,828,461	20,514,438
District of Columbia.....	971	5,552,526	5,496	1,389	261	3,924,612	5,965,400	11,882,316
Florida.....	426	8,210,680	4,564	558	882	1,270,875	3,040,119	5,546,448
Georgia.....	3,593	20,672,410	18,337	3,619	2,319	5,266,152	24,143,939	36,340,948
Idaho.....	162	677,215	374	8	6	136,326	844,574	1,271,317
Illinois.....	14,549	140,652,066	120,558	15,293	8,936	57,429,085	259,843,907	414,564,673
Indiana.....	11,198	65,742,962	62,072	3,615	3,821	21,960,888	100,262,917	148,006,411
Iowa.....	6,921	33,987,886	25,282	1,431	1,559	9,725,962	48,704,311	71,045,926
Kansas.....	2,503	11,192,315	11,189	392	531	3,995,010	21,453,141	30,843,777
Kentucky.....	5,328	45,813,039	30,949	3,529	2,918	11,657,444	47,461,590	75,483,377
Louisiana.....	1,558	11,462,468	10,171	1,385	661	4,860,371	14,442,506	24,205,183
Maine.....	4,481	49,988,171	35,431	13,777	8,746	18,623,818	51,120,708	79,829,799
Maryland.....	6,787	58,742,384	46,698	21,700	6,547	15,904,865	66,937,546	106,780,563
Massachusetts.....	14,352	308,806,165	228,534	105,976	17,445	128,315,862	356,972,655	631,185,284
Michigan.....	8,873	92,930,959	68,445	4,784	4,362	25,313,682	92,900,209	150,715,025
Minnesota.....	3,493	31,004,811	18,937	1,636	674	8,618,094	55,660,198	76,065,198
Mississippi.....	1,479	4,727,600	4,887	413	527	1,192,645	4,667,183	7,518,302
Missouri.....	8,592	72,507,844	54,200	5,474	4,321	24,309,716	110,798,392	165,386,205
Montana.....	196	899,390	574	3	1	318,759	1,006,442	1,856,567
Nebraska.....	1,403	4,881,150	4,464	120	209	1,742,311	8,208,478	12,627,336
Nevada.....	184	1,323,300	556	5	16	461,807	1,049,794	2,179,626
New Hampshire.....	3,181	51,112,263	29,356	16,184	3,291	14,514,793	43,752,462	73,978,028
New Jersey.....	7,123	106,226,593	86,787	27,099	12,152	46,083,045	165,285,759	254,380,236
New Mexico.....	144	463,275	553	...	4	218,731	871,352	1,284,546
New York.....	42,739	514,246,575	364,549	137,455	29,529	198,634,029	679,612,545	1,080,66,596
North Carolina.....	3,802	13,045,639	12,818	2,989	2,352	2,740,768	18,090,937	20,095,037
Ohio.....	20,699	188,939,614	152,217	18,563	12,529	62,108,500	215,734,258	348,298,390
Oregon.....	1,030	6,312,056	3,280	96	97	1,667,046	6,954,436	10,31,232
Pennsylvania.....	31,232	474,510,993	284,359	73,046	29,667	134,055,904	465,020,563	744,818,445
Rhode Island.....	2,205	75,575,943	37,060	18,270	7,548	21,355,619	58,103,443	104,163,621
South Carolina.....	2,078	11,205,894	19,987	1,023	1,118	2,886,289	9,885,538	16,788,003
Tennessee.....	4,326	20,092,845	19,575	1,196	1,674	5,254,775	23,534,262	37,074,586
Texas.....	2,996	9,245,561	11,645	116	898	3,843,087	12,956,269	20,719,928
Utah.....	640	2,656,657	2,042	221	232	558,863	2,561,737	4,324,992
Vermont.....	2,574	23,265,224	14,438	2,271	831	5,164,479	18,330,677	31,354,366
Virginia.....	5,710	26,968,990	28,779	6,144	5,261	7,425,261	32,833,933	51,780,992
Washington.....	261	3,202,497	1,110	25	12	532,226	1,667,469	3,250,134
West Virginia.....	2,375	13,883,390	12,900	346	1,065	4,313,965	14,027,388	22,567,126
Wisconsin.....	7,674	73,821,802	48,255	6,241	2,613	18,814,917	85,796,173	128,255,450
Wyoming.....	57	364,673	380	...	11	187,798	601,214	898,494
The United States.....	253,352	\$2,790,272,606	2,025,335	531,639	181,921	\$947,953,795	\$3,396,823,549	\$5,369,579,191

The whole number of manufacturing establishments returned in 1870 was 252,148; hands employed, 2,053,996; capital invested, \$2,118,208,769; wages paid, \$775,584,343; value of materials used, \$2,488,427,242; value of products, \$4,232,325,442. Gas, which is excluded from the returns of 1880, is included in those for 1870. The number of gas-works returned in 1870 was 390; capital invested, \$71,773,694; value of products, \$32,048,851. In the table

on the next page are given the returns of the leading industries in 1880, other than those of cotton, wool, iron, and steel. But three industries employ a capital of over \$100,000,000 each: lumber, flouring and grist mills, and foundries and machine shops. The last named paid the highest amount in wages, nearly \$66,000,000. The boot and shoe industry, with a capital of less than \$55,000,000, paid nearly \$51,000,000 in wages.

INDUSTRIES.	No. of establishments.	Capital.	Average number of hands employed.				Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youth.				
Agricultural implements.....	1,943	\$62,109,668	88,813	73	1,194	\$15,859,610	\$31,581,170	\$68,640,486	
Blacksmithing (see also Wheelwrighting)....	28,101	19,618,852	33,992	13	516	11,126,001	14,572,863	43,774,271	
Boots and shoes *.....	17,972	54,858,801	104,021	25,946	3,852	50,995,144	114,966,575	196,920,481	
Boots and shoes, rubber.....	9	2,425,000	2,514	1,984	164	1,469,088	6,028,053	9,705,724	
Brass and copper, rolled.....	26	9,057,600	4,105	673	804	2,524,169	9,528,157	14,329,791	
Brass castings.....	396	5,740,237	5,573	263	401	2,729,794	5,894,452	10,808,742	
Bread and other bakery products.....	6,896	19,155,286	18,225	2,210	1,838	9,411,828	42,612,027	65,824,896	
Brick and tile.....	5,631	27,673,616	59,082	268	7,055	18,443,582	9,774,884	32,883,587	
Carpentering.....	9,184	19,541,358	53,547	74	517	24,582,077	51,621,120	94,152,189	
Cars, railroad, street, and repairs †.....	130	9,272,680	13,885	12	834	5,507,758	19,780,271	27,997,591	
Carriages and wagons (see Wheelwrighting).....	3,841	87,973,498	43,680	273	1,491	18,988,615	80,597,056	64,951,617	
Cheese and butter (factory).....	8,932	9,604,803	6,419	1,380	154	1,546,495	18,368,579	25,742,510	
Clothing, men's.....	6,166	79,561,696	77,255	80,994	2,564	45,940,353	181,363,282	209,548,460	
Clothing, women's.....	562	8,207,273	2,504	22,253	845	6,661,005	19,559,227	32,004,794	
Coffee and spices, roasted and ground.....	800	6,866,892	2,125	438	158	1,870,699	18,201,802	22,924,894	
Confectionery.....	1,450	8,486,874	6,187	2,827	817	3,242,852	17,125,775	25,687,083	
Cooperage.....	3,898	12,178,726	24,435	42	1,496	8,992,603	18,441,064	33,714,770	
Cutlery and edge tools.....	429	9,859,885	9,458	880	681	4,447,349	4,682,222	11,661,870	
Drugs and chemicals.....	592	28,598,458	8,144	1,138	263	4,157,163	24,380,566	88,173,658	
Dyeing and finishing textiles ‡.....	191	26,223,981	12,788	2,038	1,872	6,474,364	18,664,295	32,297,420	
Fertilizers.....	364	17,913,660	14,677	75	146	2,648,422	15,595,078	23,650,795	
Flouring- and grist-mill products.....	24,388	177,361,878	58,239	42	126	17,422,316	441,545,225	505,185,712	
Foundry and machine-shop products.....	4,958	154,519,484	140,459	675	4,217	65,952,133	103,845,083	214,878,468	
Fruits and vegetables, canned and preserved.....	4,111	8,247,488	10,688	15,463	5,804	2,779,960	12,051,293	17,599,576	
Furniture.....	4,848	38,669,764	45,186	917	2,626	20,583,794	81,416,768	68,087,902	
Glass.....	211	19,844,699	17,773	741	5,658	9,144,100	8,028,621	21,154,571	
Hardware.....	492	15,363,551	14,481	814	1,506	6,846,918	10,097,577	22,653,698	
Hats and caps, not including wool hats.....	489	5,475,468	11,373	5,837	630	6,635,522	9,341,352	21,808,107	
Jewelry.....	739	11,431,164	10,050	1,998	649	6,441,688	10,324,990	22,201,621	
Lard, refined.....	26	2,513,066	1,080	46	105	546,258	21,948,826	23,195,702	
Leather, curried §.....	2,319	16,878,520	10,808	77	168	4,846,418	59,806,509	71,351,297	
Leather, dressed skins.....	202	6,266,237	4,966	208	221	2,441,372	11,063,265	15,399,311	
Leather, tanned §.....	3,105	50,222,054	28,287	188	897	9,204,243	85,949,207	118,848,886	
Liquors, distilled.....	844	24,247,595	6,452	10	40	2,663,967	27,444,245	41,068,063	
Liquors, malt.....	2,191	91,208,224	26,001	29	190	12,198,058	56,836,500	101,055,885	
Lumber, planed (see also Sash, Doors, &c.).....	1,263	17,612,928	14,614	23	652	5,890,724	24,477,548	36,808,356	
Lumber, sawed.....	25,708	181,186,122	141,564	425	5,967	81,845,974	146,155,885	293,268,729	
Malt.....	216	14,890,441	2,820	8	4	1,004,548	14,321,423	18,273,102	
Marble and stone work.....	2,846	16,438,221	21,112	23	336	10,238,885	12,743,945	81,415,150	
Masonry, brick and stone.....	1,591	3,990,706	15,877	1	142	6,880,566	10,123,475	20,556,558	
Mixed textiles ¶.....	470	37,996,057	17,471	20,520	5,382	13,316,753	37,227,741	66,221,708	
Musical instruments, organs and materials.....	171	3,922,338	3,948	89	165	2,142,539	2,632,332	6,136,472	
Musical instruments, pianos and materials.....	174	9,869,577	6,449	57	69	4,468,193	5,283,119	12,264,521	
Oil, cotton-seed, and cake.....	45	3,862,300	3,114	33	172	880,836	5,091,251	7,690,921	
Oil, linseed.....	81	5,872,750	1,378	17	21	651,677	12,874,294	15,398,812	
Oleomargarine.....	15	1,680,800	561	18	20	212,952	5,486,141	6,892,939	
Painting and paper-hanging.....	3,968	5,645,950	17,271	181	309	7,920,866	8,762,780	22,457,560	
Paints (see also Varnish).....	244	18,553,292	4,192	188	103	2,132,255	17,062,552	28,390,767	
Paper, not specified.....	692	46,241,202	16,138	740	649	8,525,355	38,951,297	55,109,914	
Patent medicines and compounds.....	563	10,620,850	2,504	1,186	385	1,651,596	6,704,729	14,682,494	
Plumbing and gas-fitting.....	2,161	5,950,512	9,217	15	452	4,770,889	9,095,808	18,133,250	
Printing and publishing.....	3,467	62,983,704	45,880	6,759	5,839	30,581,657	82,460,395	90,789,841	
Rubber and elastic goods.....	90	6,087,987	3,698	2,281	294	2,295,972	9,249,967	13,751,724	
Saddlery and harness.....	7,999	16,508,019	20,024	561	861	7,997,752	19,963,716	38,081,643	
Sash, doors, and blinds.....	1,288	20,467,670	20,544	79	1275	8,540,938	20,790,919	38,621,828	
Sewing machines and attachments.....	106	12,501,880	8,632	248	673	4,636,099	4,829,106	13,863,188	
Sewing machine cases.....	18	741,800	1,586	...	286	638,388	1,289,400	2,064,897	
Ship-building ¶.....	2,188	20,979,874	21,388	...	7	12,718,813	19,786,858	36,800,827	
Shirts.....	549	6,841,778	2,878	22,186	628	5,408,696	11,306,444	20,180,081	
Silk and silk goods.....	882	19,125,300	9,875	16,396	5,566	9,146,705	22,467,701	41,033,045	
Slaughtering and meat-packing **.....	872	49,419,213	26,113	...	1,184	10,508,580	267,738,902	303,562,418	
Soap and candles.....	629	14,541,294	4,368	888	588	2,219,518	19,907,444	26,552,627	
Sugar and molasses, refined.....	49	27,432,500	5,832	...	25	2,875,032	144,698,499	155,484,915	
Tin, copper, and sheet-iron ware.....	7,595	22,252,290	23,908	858	1,492	10,722,974	25,232,281	48,096,083	
Tobacco—chewing, smoking, and snuff.....	477	17,207,401	14,886	10,776	7,094	6,419,024	34,897,072	52,798,056	
Tobacco—cigars and cigarettes.....	7,145	21,698,549	40,099	9,108	4,030	18,464,562	29,577,838	63,955,575	
Varnish (see also Paints).....	81	8,778,100	550	...	23	866,716	3,699,634	5,721,174	
Wheelwrighting.....	10,701	10,641,080	15,821	17	270	5,074,799	6,708,677	18,892,868	

* Including custom work and repairing.

† Establishments operated by steam-railroad companies not included.

‡ Including independent dye works, bleacheries, and print works, but not establishments connected with cotton, woollen, or silk factories. The values of products are merely the values added to the fabrics by the process of dyeing, &c.

§ In the statistics of leather curried and leather tanned, establishments engaged in both industries are duplicated in "Number of establishments."

¶ See also statistics of cotton, woollen, and silk manufactures.

¶ United States navy-yards not included.

** Retail butchering establishments not included.

—The census statistics of specific cotton manufactures are the statistics of those establishments which work cotton into a fabric known and sold under that name. The classification includes spinning spindles making yarn for

mixed goods, and spindles appurtenant to looms on which cotton is woven into cotton cloth. It excludes nearly but not quite all hosiery mills, and all mills known as woollen mills, even though cotton may be the component ma-

terial of chief value in the fabrics made in them. The returns for the United States, and also for New England, the chief seat of the industry, are as follows:

COTTON MANUFACTURES.	United States.	New England.
Number of establishments.....	756	439
Capital invested.....	\$208,280,346	\$156,754,690
Number of spindles.....	10,653,435	8,632,057
Number of looms.....	225,759	184,701
Operatives:		
Total number.....	172,544	125,779
men.....	59,685	45,521
women.....	84,539	62,554
boys under 16.....	15,107	10,051
girls under 15.....	18,213	7,653
Cotton consumed, bales.....	1,570,344	1,129,493
" pounds.....	750,343,981	541,373,880
Cost of cotton.....	\$86,943,725	\$63,169,434
Goods made, pounds.....	67,264,241	482,744,610
" yards.....	2,273,273,025	1,513,478,967
Wages paid operatives.....	\$42,040,510	\$32,170,861
Value of materials.....	102,206,343	74,290,026
" products.....	192,090,110	143,363,030

In New York, New Jersey, Pennsylvania, Delaware, and Maryland there were 139 mills, with 1,391,164 spindles and 27,318 looms, and an invested capital of \$31,014,759. The mills in

these states consumed in the census year 228,729 bales of cotton, and made products valued at \$29,389,286. In the southern states there were 161 mills, with 542,048 spindles and 11,898 looms. They had 16,317 hands employed, used 182,349 bales of cotton, and turned out goods valued at \$16,356,598. In addition to the above-named, there were in the United States 249 mills employed in working raw cotton, waste, or cotton yarn into hose, fancy fabrics, mixed goods, &c. They had 60,242 spindles and 4,025 looms; employed 12,928 operatives, who received \$3,573,909 in wages; consumed 40,597 bales of cotton; and made products valued at \$18,860,273, with an invested capital of \$11,224,448. Including both of the above-named branches of this industry, the aggregate statistics of cotton manufacture are: number of establishments, 1,005; capital invested, \$219,504,794; hands employed, 185,472; wages paid during the year, \$45,614,419; value of materials, \$113,765,537; value of products, \$210,950,383.—The statistics of manufactures from wool in the United States during the year ending May 31, 1880, are:

WOOLLEN MANUFACTURES.	All classes of manufactures from wool.	Woollen goods.	Carpets other than rag.	Felt goods.	Worsted goods.	Wool hats.	Hosiery and knit goods.
Number of establishments.....	2,639	1,990	195	26	76	43	359
Capital.....	\$150,091,869	\$96,095,564	\$21,463,587	\$1,953,254	\$20,374,043	\$3,615,830	\$15,579,591
Hands employed:							
Total number.....	151,557	86,504	20,371	1,524	13,808	5,470	23,885
Number of males over 16.....	75,459	46,973	10,104	1,203	6,435	3,222	7,517
Number of females over 15.....	66,814	29,372	8,570	233	9,473	1,459	17,707
Number of youth.....	19,284	10,154	1,697	88	2,895	739	3,661
Amount paid in wages.....	\$47,339,087	\$25,836,392	\$6,835,218	\$439,760	\$5,638,027	\$1,393,215	\$6,701,475
Wool consumed:							
Weight as received at mill:							
Foreign (pounds).....	73,200,698	20,432,667	34,003,252	709,067	15,687,515	1,864,139	448,753
Domestic (pounds).....	222,991,531	177,042,288	2,029,318	4,204,806	25,461,511	6,107,471	8,146,137
Weight after scouring for cards (pounds).....	171,880,831	109,724,213	23,563,216	2,733,796	26,334,635	3,597,279	5,927,692
Value.....	\$97,681,604	\$67,380,250	\$6,975,129	\$1,624,871	\$15,235,878	\$2,644,293	\$3,821,133
Value of all materials.....	164,371,531	100,345,611	18,954,377	2,530,710	22,013,628	4,755,774	15,210,951
Value of products.....	267,252,913	160,606,721	31,792,802	3,619,652	33,549,942	8,516,569	29,167,227

Of the 1,990 mills making woollen goods, 570 were only carding mills. Under hosiery and knit goods were returned woollen, cotton, and mixed hosiery, and woollen, cotton, and mixed knit goods.—The following presents a general summary of the iron and steel production in the United States according to the census of 1880, as compared with that shown by the census of 1870:

IRON AND STEEL MANUFACTURES.	1870.	1880.	Percentage of increase in 1880.
Number of establishments.....	808	1,005	24.38
Amount of capital, real and personal, invested.....	\$121,772,074	\$230,971,884	89.68
Value of all materials used.....	\$135,526,132	\$191,271,150	41.13
Value of all products made.....	\$207,208,696	\$296,557,685	43.12
Weight of all products (tons, of 2,000 lbs.).....	3,655,215	7,265,140	98.76
Total hands employed.....	77,556	140,973	81.78
Total amount paid in wages.....	\$40,514,931	\$55,476,735	36.94

The total number of establishments in 1880 comprised 490 blast furnaces, 324 rolling mills, 73 steel works, and 118 forges and bloomaries. The production of each branch of the iron and steel industries in 1870 and 1880, with the percentage of increase, was:

IRON AND STEEL PRODUCTS.	Census year 1870.	Census year 1880.	Percentage of increase in 1880.
	Tons.	Tons.	
Pig-iron and castings from furnace.....	2,052,821	3,731,021	84
All products of iron rolling-mills.....	1,441,829	2,353,243	63
Bessemer-steel finished products.....	19,403	889,596	4,486
Open-hearth steel finished products.....	.....	93,143	.....
Crucible-steel finished products.....	28,069	70,319	151
Blister and other steel.....	2,285	4,956	117
Products of forges and bloomaries.....	110,808	72,537	35*
Total.....	3,655,215	7,265,140	99

* Decrease.

In the Bessemer and open-hearth steel works the following finished products were produced during the census year 1880:

FINISHED PRODUCTS.	Bessemer steel.	Open-hearth steel.
	Tons.	Tons.
Rails.....	741,475	9,105
Bars.....	76,710	43,296
Kods.....	49,064	1,134
Shapes.....	557	80
Sheets.....		1,700
Plates.....	1,475	11,034
Other forms.....	20,615	26,794
Total	889,896	93,143

The quantity of Bessemer-steel ingots produced in the census year 1880 was 985,208 tons; of open-hearth steel ingots, 84,302 tons. The production of crucible-steel ingots was 76,201 tons. The leading state in the iron and steel industry is Pennsylvania, for which the census statistics of 1880 are: number of establishments, 366; capital invested, \$107,304,782; hands employed, 57,952; wages paid, \$25,095,850; value of all materials used in census year, \$92,267,030; value of products, \$145,576,268; weight of products, 3,616,668 net tons. The production of iron ore in the United States was 7,974,706 tons, valued at \$23,167,007. There were 805 establishments, 31,668 employees, \$9,538,117 wages paid, and \$61,782,287 capital invested. The production of precious metals during the year ending June 1, 1880, as returned by the census authorities, comprised 1,614,741 ounces of gold, valued at \$33,379,663, and 31,797,474 ounces of silver, worth \$41,110,957, making a total value of \$74,490,620. The production of deep mines included in the above was 1,033,974 ounces of gold, valued at \$21,374,152, and 31,717,297 ounces of silver, worth \$41,007,296; total, \$62,381,448. The total yield of placer-mines was \$12,109,172, including 580,767 ounces of gold, worth \$12,005,511, and 80,177 ounces of silver, valued at \$103,661. Of the gold, \$17,150,941 was the product of California; of the silver, \$16,549,274 was produced in Colorado, and \$12,430,667 in Nevada. The gold product of the United States, as estimated by the director of the mint, was \$38,899,858 in 1879, \$51,206,360 in 1878, \$46,897,390 in 1877, \$39,929,166 in 1876, and \$33,467,856 in 1875. The yield of silver was \$40,812,132 in 1879, \$45,281,385 in 1878, \$39,793,573 in 1877, \$38,783,016 in 1876, and \$31,727,560 in 1875. The returns of copper production in the United States east of the 100th meridian were: number of mines, 35; maximum capacity of yearly production, 62,798,866 pounds of metal; product of census year in tons of ore or rock, 994,658; product in pounds of ingot copper, 50,749,156; value of product, \$8,886,295; hands employed, 6,128; wages paid, \$3,119,903. The Lake Superior region furnishes 90·48 per cent. of the entire product, and most of the rest is from Vermont and North Carolina. The production of bituminous coal in the states east of the 100th meridian, during the year ending June 1, 1880, was 41,298,888 tons, valued at the mines at \$50,247,703. The number of mines was

2,944; maximum capacity of yearly production, 74,266,273; number of hands employed, 96,675; wages paid during the year, \$30,773,059. Of the total production, 18,495,723 tons, worth \$18,679,129, were mined in Pennsylvania. Of the rest, about 12,000,000 tons, valued at more than \$16,500,000, were the product of Ohio and Illinois. The production of bituminous coal and lignite west of the 100th meridian was 1,477,736 tons, worth \$3,272,470. The whole yield of anthracite coal in the United States was 28,646,995 tons, of which 28,640,819 were mined in Pennsylvania, and 6,176 in Rhode Island. The merchantable product of Pennsylvania was 28,612,595 tons, valued at \$42,116,500. The total number of persons employed in bituminous and anthracite coal mining in the United States was 170,785. The production of oysters in the United States was valued at \$13,438,852. There were 52,805 persons employed, and \$10,583,295 capital invested in the oyster industry. The leading oyster-producing state is Maryland, whose product was 10,600,000 bushels, valued at \$4,730,476. The product of Virginia was 6,837,320 bushels, worth \$2,218,376; New Jersey, 1,975,000 bushels, worth \$2,080,625; New York, 1,043,300 bushels, valued at \$1,577,050.

CETEWAYO, king of the Zulus, born in South Africa about 1840. He was installed as king in 1873. When the troubles arose that led to the war of 1879 (see ZULULAND, THE WAR IN) he had a well-disciplined army of more than 40,000 men, which he led with great skill. Many of them had breech-loading rifles, which had been sold to them by English traders for their predatory war against the Boers; the remainder were armed with the assegai, a native weapon, between a spear and a knife. With this army Cetewayo defeated a British force at Rorke's Drift, on Buffalo river, in January, 1879, the Zulus losing heavily as they charged upon the camp, but putting to death all who remained when they reached it, only a few soldiers escaping by clambering down a precipice and crossing the river. On April 2 Cetewayo, with his whole army, attacked a British camp near Ekowe, but was driven off with heavy loss. On the 4th of July, with 20,000 men, he attacked 4,000 at Ulundi. The British kept up so destructive a fire with artillery, musketry, and Gatling guns, that the Zulus found it impossible to get near enough for hand-to-hand fighting, and were cut to pieces and dispersed. Cetewayo was captured August 28, in the forest, and, after being kept a prisoner for some time at Cape Town, was carried to England, that he might get an idea of the power of the British government and the uselessness of contending with it. In September, 1882, he was taken back to his kingdom and reinstated, but with the condition that he should not raise another army. He was afterward defeated with great loss by other native chiefs.

CHALLIS, James, an English astronomer, born in 1804, died in February, 1883. He was educated at Trinity college, Cambridge, and became a fellow of his college and professor of astronomy in the university. He published "Astronomical Observations made at the Cambridge Observatory, 1836-'60," "Creation in Plan and Progress," "Notes on the Principles of Pure and Applied Calculation, and on the Theories of the Physical Forces," "A Translation of St. Paul's Epistle to the Romans, with Notes," "An Essay on the Mathematical Principles of Physics," "Remarks on the Cambridge Mathematical Studies, and their Relation to Modern Physical Science," "Lectures on Practical Astronomy and Astronomical Instruments," "An Essay on the Scriptural Doctrine of Immortality," and "The Counting and the Interpretation of the Apocalyptic Number of the Beast."

CHANDLER, Zachariah, an American senator, born in Bedford, N. H., Dec. 10, 1813, died in Chicago, Nov. 1, 1879. His education was limited to that of the common schools and an academy. In 1833 he removed to Detroit and engaged in the dry-goods business, in which he was successful. In 1851 he was elected mayor of Detroit, and in 1852 was nominated for governor by the whigs; and, although his success was hopeless, the large vote which he received brought him to public notice. From 1857 till 1875 he was a member of the United States senate, served as chairman of the committees on the District of Columbia and on commerce, and became one of the most influential leaders of the republican party. During the term succeeding his reelection in 1863 he again served as chairman of the committee on commerce, and also on the committees on revolutionary claims and mines and mining. From October, 1875, till March 4, 1876, he was secretary of the interior in President Grant's cabinet. Early in 1879 he was again elected to the senate for the unexpired term of Senator Christiancy, who had resigned. He took an active part in the exciting presidential campaign of 1876, being the chairman of the republican national executive committee. During the greater portion of his life he was engaged in large business enterprises, from which he realized a handsome fortune.

CHAUTAUQUA ASSEMBLY, an educational organization, which meets annually on Chautauqua Lake, Chautauqua co., N. Y. It was projected in 1873 by Lewis Miller of Akron, O., and the Rev. J. H. Vincent, D. D., editor and secretary of the Sunday-school department of the Methodist Episcopal church, and met for the first time in August, 1874. In its original form it was a Sunday-school teachers' institute, lasting for two weeks, and was designed, by means of lectures, drills, and object-lessons, to prepare Sunday-school teachers for their work. The plan met with emphatic approval, and has gradually been so expanded as to include instruction in topics lying altogether outside of

Sunday-school interests. Out of the assembly have also grown other permanent organizations. The wants of a large class of persons of limited education have been met by the "Chautauqua Literary and Scientific Circle" (commonly spoken of by the initials C. L. S. C.), a sort of home college, which enrolls about 25,000 members and prescribes a course of reading, averaging 40 minutes daily for four years. For the use of the "Circle" text-books in different branches of study have been prepared, and others have been adopted. The student, on passing a satisfactory written examination at the end of the course, receives a certificate. Besides the "Circle" there is a Chautauqua "Foreign Missionary Institute," a "School of Languages," a "Teachers' Retreat," a "School of Theology," and a "Young Folks' Reading Union."

CHESNEY, Charles Cornwallis, an English author, born in 1829, died March 19, 1876. He entered the British army in the corps of engineers, and rose to the rank of colonel by brevet. For several years he occupied the chair of military art and history in the staff college at Sandhurst. He published "Campaigns in Virginia" (1863); "Waterloo Lectures" (1868); "Military Resources of Prussia and France," jointly with Mr. Reeve (1870); "Military Biographies," including several on generals in the American civil war (1870, republished in New York); and "The Conquest of England in 1875, and the Battle of Dorking; or, Reminiscences of a Volunteer" (1871), which created a great sensation, being intended to awaken his countrymen to the defenceless condition of their island if a continental army should land upon its shores. Col. Chesney is almost the only Englishman who has written with ability and fairness on American military affairs.

CHILI, PERU, AND BOLIVIA, the War between. Under a treaty negotiated in 1874, Bolivia granted to certain Chilean capitalists the privilege of working the nitrate deposits at Antofagasta, on the edge of the Atacama desert, one of the three Bolivian seaports, free from export duty. But early in 1879 the Bolivian government, perhaps inspired by Peru, which but for the Bolivian deposits would have a virtual monopoly of the world's supply of nitrates, imposed such a tax upon the Antofagasta works. The Chilean government thereupon sent troops and ships to protect the property of the Chileans. On Feb. 6 Peru and Bolivia signed a secret treaty of mutual defence, and at the beginning of March President Daza of Bolivia called his people to arms and embargoed such Chilean property as was within his reach, expelling its owners from the country. The Chilean troops occupied Caracoles and Mejillones de Bolivia, and captured Calama, defeating a Bolivian force near that town on April 3. In this quarter the hostile forces now found themselves separated by a practically impassable desert, and the territory concerning which the quarrel arose was left in the

possession of the Chilians, while the war was transferred to the sea, which now again, as during the civil war in the United States, witnessed some serious engagements. In May the powerful navy of Chili bombarded Iquique and Pisagua (where, it is said, damage to the extent of \$1,000,000 was done), and burned Mejillones de Peru, the launches there being also destroyed. A blockade was established at Iquique; but Admiral Grau of the Peruvian ironclad *Huascar*, accompanied by the ram *Independencia*, taking advantage of the absence of part of the blockading fleet, attacked on May 21 what was left of it, consisting of the wooden corvette *Esmeralda*, the despatch boat *Covadonga*, and the transport *Limari*. The *Huascar* summoned the corvette to surrender, but, receiving a broadside in reply, crashed her ram three times into her wooden side, and she speedily sunk with her colors flying, carrying down all but 65 of her crew of about 150. Her commander, Capt. Arthur Pratt, with a few companions, leaped, cutlass in hand, upon the *Huascar*'s deck; but they were all cut down by the Peruvians, who made a sally from the turret. The *Covadonga* had been engaged by the *Independencia*, an iron-clad frigate built at London in 1865 and carrying 14 guns, the finest vessel in the Peruvian navy. The *Covadonga* lured her enemy into shallow water, where the latter struck upon a rock and became a total loss, being burned by Admiral Grau to prevent her from falling into the Chilians' hands. The *Covadonga* and *Limari* escaped safely to Antofagasta. The *Huascar*, after destroying several Chilean craft, had indecisive combats with the ironclad *Blanco Encalada* and the corvette *Magallanes*, and upon a later cruise, in company with the corvette *Union*, captured two merchantmen and the transport *Rimac*, with a regiment of cavalry on board and munitions of war for the Chilean forces at Antofagasta, and a cargo of coal for the fleet, which had resumed the blockade of Iquique. The *Huascar* and *Union* next ravaged the Chilean coast, and on Aug. 23 bombarded for five hours the defences at Antofagasta, inflicting some damage upon the gunboat *Abtao*, which lay there. Admiral Grau's triumphant course came to a conclusion on the 8th of October, off Mejillones de Bolivia, when, steaming away from the *Blanco Encalada* and a fleet of pursuers from the south, he fell in with the *Almirante Cochrane*, which was coming from the other direction. These two powerful ironclads are sister ships, built at Hull in 1874 and 1875, each of 2,200 tons, 210 feet long, protected by 9-inch armor plates backed with 10 inches of teak, and carrying broadside batteries of six 12½-ton rifled guns. The *Huascar* was a turret ship of "monitor" fashion, built on the Clyde in 1865, 200 feet long, protected by 4½ inches of iron and 14 of teak, and carrying three 300-pounder Armstrong rifles in her turret and three smaller guns outside of it. Although the Peruvian was terribly overmatched, the battle lasted

for 2½ hours; and not until the gallant Admiral Grau and his first and second officers had been killed, their vessel terribly shattered, and 86 men only of the 210 who went into action left alive, was she captured by a boarding party. She was then in such a condition that her captors did not believe she could be made available for further service; but she was repaired, and took part in an attack upon Arica, Peru, in February, 1880. On Sept. 1 Calama had been recaptured by the allies; but their reverses at sea now left their coasts unprotected, and on Nov. 2 the Chilean fleet landed a force of 12,000 well-drilled men at Pisagua, Peru, who captured that town after a brisk fight. On Nov. 8 these troops took Tarapacá; and on Nov. 19, at Dolores, a severe battle was fought, which resulted in the defeat of the allies with great loss. Another battle was fought Nov. 27, at Tarapacá. It was indecisive, but left the southernmost districts of Peru completely in the hands of the Chilians. The Peruvians now returned to Arica, and the Bolivians toward the interior. The discontent at the Peruvian capital with the results of the war was such that President Prado, with the fate of two former rulers of the country before his eyes, deemed it the part of prudence to embark at Callao for the United States. The secretary of war, Gen. La Coteria, remained for a few days virtually at the head of the government; but on Dec. 22, after a battle in the streets of Lima, Col. Nicolas de Piérola (who had in former years headed several revolutionary movements) became dictator. In Bolivia, President Daza was deposed, and was succeeded by Gen. Camacho. Having landed in force north of Arica, the Chilians, on March 21, 1880, carried the strong position of Los Angeles, overlooking Moguegua, and occupied that town. After some fighting around Tacna toward the end of May, Arica was stormed and taken by the Chilians, June 7, in spite of stubborn resistance. The Peruvian garrison of about 2,000 men were all killed or taken prisoners, and the monitor *Manco Capac* was sunk in the harbor. The blockade of Callao was next begun, and preparations were made for an attack on Lima.—After the whole of the little Peruvian navy had fallen into the hands of the Chilians, the conquest of the coast lands was only a question of time, as all the Peruvian railroads run at right angles to the sea, and the Chilians could choose the unguarded points to attack. Chili surpassed the allies almost as greatly in her military resources as in her navy. She had prepared for the war, while Peru and Bolivia were taken by surprise, and Peru in her financial straits had recently reduced her army. The Chilean soldiers, of mixed Indian and Spanish blood, are strong, capable of discipline, and many of them hardened in the fierce warfare with the Araucanian Indians. The Peruvian infantry are of the race of the Incas. Their powers of endurance are extraordinary, and they are very brave when their heart is

in a cause. The Bolivian soldiers are Aymara Indians, a hardy race of mountaineers. The Peruvian and Chilian infantry were both well armed, the former with Martini-Peabody, the latter with Gras or Comblain rifles; but the Bolivians had only 1,500 modern weapons. The Chilian cavalry are experienced soldiers, well mounted and armed with Winchester repeating rifles; the small force of Peruvian cavalry, mostly composed of negroes and half-breeds, was similarly armed, but poorly mounted. The Peruvian cannon, of Lima manufacture, were worthless against the Krupp and Armstrong guns of the Chilians, who could begin an action with 12-pounders at 4,000 yards, and were also provided with Gatling and Nordenfeldt machine guns. After the Chilians had destroyed the Peruvian fleet, obtained possession of the province of Tarapacá, and in the campaign of Tacna defeated the allied armies, taking terrible reprisals, the United States offered to mediate a peace, in October, 1880. A conference was agreed to, and the plenipotentiaries met Oct. 22. The Chilian representatives demanded the cession of the Bolivian province of Atacama and the Peruvian province of Tarapacá south of the river Camarones, with the payment of \$20,000,000 of war indemnity, as well as the abrogation of the defensive treaty of 1873. The allies would not submit to the annexation of territory, but offered to refer the questions in dispute to the arbitration of the United States. Chili refused arbitration, so that negotiations were broken off. An expeditionary force of 30,000 men was organized for the attack upon the Peruvian capital. The first detachment landed at Pisco Nov. 19. The Chilian commander was General Baquemade. There were not 2,000 of the Peruvian army left. Nicolas de Pierola called all the able-bodied citizens to arms, and an enthusiastic army of defence was collected. Breastworks were hastily thrown up along a line of defence, on the edge of the desert, south of the town, and an inner line six miles from Lima. The Chilian division which debarked at Pisco, under the command of Capt. Lynch, advanced, subsisting on the country, and joined the rest of the army at Curayaco. They attacked the Peruvian line on the 13th of January, 1881, crossing the desert from Lurin in the night time. The Peruvian left, which was first attacked, held its ground, but the right wing was flanked by the Chilian reserves and driven back. The Peruvians retreated to Chorrillos and the eminence of Morro Solar, and there made a gallant resistance, but when driven out upon the point of Chorrillos, the remnant surrendered. Reinforcements, which arrived too late, were fiercely set upon by the second Chilian division, and overpowered. About 4,000 Peruvians were killed in the battle of Chorrillos, and 2,000 Chilians were killed or wounded. The Ministers of England, France, and San Salvador, in Lima, intervened on the 15th, in the hope of preventing further blood-

shed. An armistice was arranged for the discussion of terms, but through a blunder it was broken, and a general engagement took place at Miraflores along the second line of defence. The armies were each 12,000 or 13,000 strong. The Peruvian raw recruits and volunteers made a brave resistance against the veteran Chilian army and its destructive artillery fire for four hours, and the Peruvian slain numbered 2,000. Lima was formally surrendered by the alcalde on the 16th, and occupied by Chilian troops on the 17th. With the capture of Lima the whole coast region of Peru was in the possession of Chili. Pierola, the head of the provisional government, was willing to treat for peace, and negotiations were begun, but they were broken off by the Chilian authorities, who refused to recognize the Pierola government as constitutional and competent to conclude a treaty. Capt. Patrick Lynch was appointed military governor of Lima. Dr. Garcia Calderon was commissioned by a meeting of citizens to organize a provisional government. But the fact that he had organized his administration under the auspices of the Chilians was fatal to its influence and authority. He called together the congress last elected, but only a few members responded, and those refused to authorize the permanent cession of any Peruvian territory. The congress was dissolved Aug. 23, 1881. Calderon was encouraged to expect that the United States would intervene, by the assurances of the American minister and the recognition of his government by the United States; and these relations with the United States representatives were the cause of the forcible removal and imprisonment of Calderon by Gov. Lynch, Sept. 28, 1881. On July 28, Supreme Chief Pierola summoned a national assembly at Ayacucho. He resigned the dictatorship and was elected provisional president, which office he also resigned on the 28th of November. Admiral Montero, who had been chosen vice president under Calderon, assumed the direction of affairs. In August, 1882, he proceeded from the north of Peru to Arequipa, and there formed a government. The allied governments undertook to reorganize the armies, in the hope of obtaining more favorable terms from the victors. In January, 1882, a Chilian force of 5,000 men occupied the valleys of Tarma and Xauxa, and garrisons were placed in those towns and at Oroya bridge, in Concepcion, and in Huancaayo. Gen. Caceres had charge of the Peruvian reorganization in the central provinces, while Iglesias held the command in the north. In July Caceres took the field, and drove the Chilians out of Xauxa and the other occupied districts in the Andes. The Chilian garrison in Concepcion was attacked and cut to pieces on the 9th of July, 1882. The Chilian commander, Del Canto, then withdrew the other garrisons to Chila, the terminus of the railroad, after burning the town of Concepcion. On July 22 the Peruvians crossed the mountains and at-

tacked the garrison at San Bartolomeo, on the railroad, about 50 miles from Lima. With reinforcements from Lima the Chilians repelled them, but drew back their line to Chosica, 24 miles out of Lima. Caceres, having cleared the Andean districts of the invaders, established his headquarters at Tarma in August. In northern Peru the town of Caxamarca was occupied by a force, advancing from the Port of Pacasmayo, which Iglesias was not able to resist. But in September, 1882, the Chilians retired again to the coast. Negotiations for peace were undertaken at various times, through the mediation of the American and of European governments, and directly between the belligerent powers, but without practical results till the summer of 1883, when a treaty was made, the principal provisions of which were: the absolute cession of Tarapacá; the fate of Arica and Tacna to be decided by a plebiscite after ten years' occupation by Chili, the losing nation receiving \$10,000,000 indemnity from the country acquiring the property; Chili to pay the Peruvian bondholders half the net proceeds of the guano taken from the deposits now known in the ceded territory, any that may be hereafter discovered to belong to Chili exclusively; the private interests held in the nitrate deposits to be respected by Chili; Chili to give Peru half the net proceeds obtained from the guano at the Lobos islands. See "The War between Peru and Chili," by Clements R. Markham (New York, 1883).

CHRISTIAN UNION CHURCHES OF THE WEST, a body of Christians which took its rise in the western part of the United States in 1863-'4. The chief object of the movement is said to be the union of all Christians upon what may be regarded as the essential and fundamental doctrines of Christianity. The official statement of principles is as follows: 1. The oneness of the church; 2. Christ the only head; 3. The Bible the only rule of faith and practice; 4. "Good fruits" the only condition of fellowship; 5. The repudiation of controversy; 6. Each local church governs itself; 7. Do not preach partisan politics. From this statement it appears that these churches, as union churches, have no definite creed, but claim to be governed exclusively by the Bible. They repudiate all sectarian opinions, and allow unlimited exercise of private judgment in all matters except those which they hold as necessary to salvation. Their form of ecclesiastical polity is congregational; each church in the union is independent; it is called a "church of Christ," and its members Christians, disciples, saints, and the like. These churches coöperate with Christians of other names in supporting the American tract society, the American Bible society, the young men's Christian association, and similar undenominational institutions. Their houses of worship are open to all whom they regard as preaching Christ, or who desire to worship the true God. The union churches are strong in Ohio, Indiana, Illinois, Michigan,

Iowa, Missouri, Minnesota, Kansas, Arkansas, Texas, and other western and southwestern states. A general council, composed of delegates from the different states, was held for some time every two years; but in 1878 it was resolved to hold such council every four years. Each state also holds an annual council. In their view, there is but one order of ministers, that of elder, and they urge all, learned and unlearned, who feel so disposed, to labor for Christ. At the general council of 1878, held in Wesley, Ind., May 15, sectarianism was strongly denounced; it was affirmed that all Christians in any locality are equal as brethren, and that no human creeds, tests, and usages are to be regarded as of any value; that the church is divine, and not man-made, and membership "does not depend upon doctrinal views, baptism, votes, or enrollment, but on a loving and obedient heart." The Bible was again declared to be a divine revelation, and a sufficient rule for religion, faith, and practice. Sunday schools were advocated, especially with pious teachers; the establishment of a college, free from all denominational restraint, was urged upon the churches; and ministers were advised to study the sciences, in order to fit them for being more useful and effective in their work. It is computed that the union includes at least 100,000 members.

CHUKCHI, or *Tsan-chū*, a people of Kariak race, inhabiting the eastern extreme of Siberia, between the Anui river and Bering strait. They have received various names in ethnological literature, but call themselves *Tsau-yu'* or *Chau-chū'*. Owing to the existence of certain Esquimaux (Yüit) settlements on the coast near Bering strait, and possibly some mixture of blood through the marriage of Esquimaux women to Chukchi men (the reverse never takes place), a considerable amount of confusion has arisen in regard to these people, and even in the most recent accounts has not wholly disappeared. Originally the Chukchi, like the majority of the Kariaks, are nomadic, living in peculiar tents made of deerskins, and subsisting by means of large herds of tame reindeer, with which they move from place to place. Owing to an epidemic which sometimes destroys immense numbers of deer, some individuals become impoverished and are obliged to resort to the seacoast and obtain their living by hunting walrus, seal, and other marine animals, including even the polar or "bowhead" whale. These last people live, as do the adjacent Esquimaux, at least during part of the year, in regular villages; hence they are commonly referred to as Sedentary, Fishing, or Bowhead Chukchi, while their more fortunate relatives are called Reindeer or Wandering Chukchi. With the former the Asiatic Esquimaux have repeatedly been confounded, on account of their similarity in dress, habits, and customs, although the two peoples speak distinct languages and belong to totally different races. The Sedentary Chukchi are provided with skin

boats, and in summer frequently visit and trade with the Esquimaux who inhabit the Diomedes in Bering strait and on the adjacent American coast. They are rather tall, light brown, good-natured, and hospitable, dirty in many of their habits, but honest and industrious, except where demoralized by liquor from illicit traders. The Reindeer men range through large areas of the interior with their herds. The Bowhead men live on the coast from Cape Chelagskoi around by Bering strait as far south and west as the mouth of the Anadyr river. The most northern village of the Asiatic Esquimaux is on the eastward front of East cape, and is called Nūwūkan (from Nūwūk, point or cape). Thence they extend, somewhat widely separated, from point to point along the coast, the most southern village having been lately established at Cape Olintorsk by Esquimaux from the village at Plover bay. The number of the Sedentary Chukchi is estimated by Nordenskiöld at 2,500, and the Wandering Chukchi at about the same. The number of Esquimaux on the same coast will probably not reach 1,000. The Chukchi were first brought into notice by their energetic resistance to the *yassak* or tribute exacted by Russian adventurers from the native tribes of eastern Siberia. To the present day these people remain free and independent. They were first visited by Russian traders from the Kolyma river in 1646, and all efforts to subdue them proved futile. Their history and mode of life are given by Nordenskiöld ("Voyage of the Vega," 1882), their ethnic relations by Dall ("American Naturalist," 1881), and their language by Nordqvist ("Scientific Results of the Vega Expedition," 1882).

CHURCH, Sanford Elias, an American jurist, born at Milford, N. Y., April 18, 1815, died in Albion, May 14, 1880. He received an academic education, and settled in Albion, Orleans co. He began the practice of law in 1840, and was the next year elected to the legislature as a democrat. In 1845 he was appointed district attorney of his county, and two years later he was elected to the same office. In 1850 he was chosen lieutenant governor, and he was reelected two years later. In 1857 he was elected comptroller of the state. He was chairman of the committee on finance in the state constitutional convention of 1867. He was elected in 1870 chief justice of the state court of appeals, and was in office when he died.

CLARKE, John S., an American comedian, born in Baltimore in 1835. He made his debut in August, 1852, at the Chestnut street theatre, Philadelphia. In 1853 he became leading comedian in that theatre, and in the following year accepted the same position at the Front street theatre, Baltimore. From 1855 to 1858 he played at the Arch street theatre, Philadelphia, when he became joint lessee and manager with William Wheatley. In 1861 he appeared at the Winter Garden, New York, of which he became joint lessee two years later;

and in 1865, with his brother-in-law Edwin Booth, he purchased the Walnut street theatre, Philadelphia. He became joint lessee of the Boston theatre, and appeared in that city for the first time, in 1866. The Winter Garden was burned in January, 1867, and in the autumn of that year Mr. Clarke appeared with great success at the St. James, London, as Wellington de Boots. He also made a hit as Bob Tyke in "The School of Reform." After a tour of the principal cities of the kingdom, he revived some of the old comedies, and appeared in London as Dr. Pangloss in "The Heir at Law." He reappeared in New York in 1870, made a starring tour in the United States, and in 1871 returned to London. In December of that year he played in Philadelphia with E. A. Sothorn, the two actors appearing alternately at two theatres on the same evening. Mr. Clarke has since added to his rôles Dr. Ollapod and Bob Acres. He is proprietor of the Charing Cross theatre.

CLÉMENCEAU, Eugène, a French politician, born at Moulleron-en-Pareds, La Vendée, Sept. 28, 1841. He studied medicine at Nantes and Paris, and was created a doctor in 1869. He then visited New York, where he married Miss Mary E. Plummer of Massachusetts. The fall of Louis Napoleon in September, 1870, induced him to return to Paris. He established himself at Montmartre, freely gave medical advice to the poor, and was soon elected mayor of the arrondissement and a member of the commission of communal education. He established secular instruction within the bounds of his jurisdiction, and was very painstaking in the discharge of his official functions. In February, 1871, he was elected a member of the national assembly, in which he associated himself with the extreme left and voted against the preliminaries of peace. On March 18 he attempted to save Gens. Lecomte and Clément Thomas, but did not arrive at the rue des Rosiers until after their execution. The central committee of communists resolved upon his arrest, but he eluded its officers. On the trial of the assassins in November, some of the witnesses accused Dr. Clémenceau of not interfering as early as he might have done; but the evidence of Col. Langlois appeared to clear him of all blame. A duel resulted between Clémenceau and the commandant de Poussargues; the latter was wounded, and the former was fined and imprisoned for a fortnight. In March he was also prominent in securing the election of a municipal council, but failed to effect a reconciliation between the government and the commune, and retired to private life. In July Dr. Clémenceau was elected to the municipal council, and took a prominent part in the discussion of educational and financial questions. He was reelected in November, 1874, and became successively secretary, vice president, and president of the council. He was elected to the chamber of deputies in February, 1876, from the 18th arrondissement of Paris, and again in October, 1877, and was for a time one of its

secretaries. He has advocated complete amnesty, the entire separation of church and state, the exclusion of the clergy from all educational matters, and the expulsion of the Jesuits. After the election of Gambetta to the presidency of the chamber, Dr. Clémenceau especially became prominent as the leader of the extreme left; and on March 3, 1879, he attacked Minister Marcère, for his laxity in removing anti-republican police officers, so vehemently as to compel that functionary's resignation. He has also taken a very active and useful part in committee work. In 1877 he challenged M. Paul de Cassagnac, in consequence of a slighting allusion, and the fighting Bonapartist refused to fight—a decision that attracted much attention at the time, Dr. Clémenceau having the reputation of being one of the most expert shots in France.

CLEVELAND, Grover, an American lawyer, born March 18, 1837, in Caldwell, N. J., where his father was a Presbyterian clergyman. The elder Cleveland preached afterward at Fayetteville and Holland Patent, N. Y., and at the schools in these places and at Clinton academy the boy received his education. When he was 16 years old his father died. His first employment was as a reader to the blind in a New York city asylum. Having determined to settle in Cleveland, O., he stopped on the way thither at Buffalo to visit an uncle, by whom he was persuaded to remain in that city, and who also aided him to enter a law office early in 1855. After four years of work as a student and clerk, and four more as managing clerk, he was appointed assistant district attorney of Erie county. In 1865 the democrats nominated him for district attorney, but his republican opponent was elected. He practiced law until 1869, when he was elected sheriff of Erie county. After the expiration of his term he resumed his legal practice, but in 1881 was elected mayor of Buffalo as a democrat. His zeal in reforming municipal abuses, and especially the desire he displayed to carry business methods into public affairs in a number of vigorous messages vetoing acts of the city council, at once attracted general attention, and the democratic state convention of 1882 nominated him for governor of New York. Owing mainly to wide disaffection among his republican opponents, he was elected by the largest majority ever known in the state, receiving 535,318 votes to 342,464 for Charles J. Folger, and carrying all but eight of the sixty counties.

CLIFF DWELLERS, the name given to an ancient semi-civilized people, probably identical in race with the Pueblo Indians, who constructed their dwellings in caves and shelves in the steep cliffs of the cañons which form the valleys of the San Juan river and its tributaries, in southwestern Colorado and the adjacent territories. These habitations were first discovered by A. D. Wilson of the Hayden surveying expedition, and were after-

ward specially explored by W. H. Jackson. A great number of these ruins are found around the edge of the desert tract enclosed by the Rio Mancos, the Rio La Plata, and the Rio San Juan, the two latter of which have some breadth of bottom land between their rocky banks, while the former is closely shut in by cañon walls several thousand feet high. Picturesque clusters of the dwellings occupy the terraces of the wider cañons, and in the bottom lands are found remains of towns. Upon narrow ledges in the face of the more precipitous cañons are groups of houses, which are now inaccessible. The marks of the perilous doubling paths and footholds by which they were once approached are still visible on the sides of the chasms, leading upward from their foot. One settlement, 1,000 feet above the Rio Mancos, must have been reached by clambering up paths hardly a foot wide from the valley below. It is overhung by projecting rocks. The houses are in groups of two or three, according to the width of the shelves on which they stand. The cliffs whose jutting ledges and hollowed indentations, produced by the action of the elements, afforded a foundation for these dwellings, are generally of sandstone, sometimes of limestone. Between the beds of firm rock are intervening strata of soft clay mixed with shells. These softer strata are eaten out by the weather, leaving caverns. In these the cliff dwellings are built, the horizontal faces of the enclosing strata forming their floors and roofs. The houses are usually no higher than a man's head, although some of them have two stories, and one has four. The division walls are carried from the bottom of the cave to the opening, where they are faced with masonry of the stone of the cliff, so skilfully as to be scarcely distinguishable from the natural wall. Round stone towers are placed in commanding positions near the cliff villages. The walls of these structures are built in a remarkably perfect curve. The only apparent reason this people could have had for building their towns on sites so difficult of approach was to guard themselves against hostile attacks. The entire absence of weapons, in a finished or unfinished state, about such of their dwellings as have been examined, proves that they themselves followed peaceful pursuits. That they were subject to formidable attacks is shown by the fact that near some of these fastnesses thousands of arrowheads have been found sticking in the cliff, all of them pointed toward the towns.—In New Mexico, Jackson found the remains of buildings of enormous dimensions, exceeding those of almost any modern edifice. One called the Pueblo del Arroya forms three sides of a quadrangle; the wings are 130 ft. long; opposite the centre of the court it is three stories high; the western wall is 268 ft. in length. The Pueblo Chetro Kettle has much more imposing dimensions. The ruins of four stories are still standing in portions; the building was 440 ft. in length and 250 ft.

in breadth. The logs which supported the floor of the second story extend through the wall and project a distance of 6 ft. outside; these probably supported a balcony. According to a calculation of Mr. Jackson, the outside wall of this building, 925 ft. long and 40 ft.

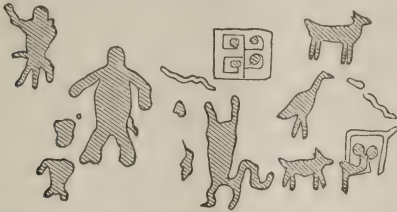


FIG. 1.—Cliff Dwellers' Inscription on the San Juan, New Mexico.

high, enclosing a quadrangle on three sides, contained 315,000 cubic feet of masonry, in which at least 30,000,000 pieces of quarried stone were used. The timbers for this structure were brought from a great distance. The peculiarities of construction common to the ruins of Colorado, to the remains of the great houses on the Gila and San Juan, in the Chaco and Chelly cañons, and in other parts of New Mexico and Arizona, and to the now inhabited and the recently deserted Pueblo and Moqui towns, indicate that they are all the work of the same race. (See CASAS GRANDES.) It

Pueblos, though superior to most of the New Mexican pottery. The form of the buildings corresponds to that of the famous Casa Grande of the Gila, which is rapidly falling into complete decay, and bears a resemblance to the pyramidal structure of the Pueblo towns. The central portion, a story higher than the rest, is indicated by the larger mass of *débris* in the centre of every ruin. The Casa Grande, which typifies this mode of construction (probably identical with the Chichilticale, or red house, mentioned in Castañeda's account of Coronado's trip to the seven cities of Cibola in 1540), was built of adobe, moulded in blocks, generally about 4 ft. long and 2 ft. wide. The inner walls were covered with this same material, to which a hard finish was given, a polished surface being still retained in places. There are several of these buildings in the neighborhood, in a ruined condition, the walls of three being still standing. The largest of the houses has a length of 50 ft. from north to south, and a width of 40 ft. The outer wall curves slightly outward from the top, the inner face remaining perpendicular, and has a thickness at the base of 5 ft. The interior is divided into five apartments. Both the outer and inner walls are pierced by small windows, circular and square. The remains of floor timbers indicate that the building had three stories, and was about 30 ft. in height, the central

portion being carried up one story higher. — In Jackson's exploratory trip to the southwestern corner of Colorado in search of Indian ruins, he met with numerous though nearly obliterated vestiges of adobe buildings on the low benches which border the Rio Mancos, and with fragments of painted, glazed, and curiously indented pottery. Not far from the entrance of the cañon of this river were similar groups of ruins, among which was one building of squared and carefully laid sandstone. The form of these habitations indicated by the ruins was the same as that of the large houses of New Mexico, with a central portion carried

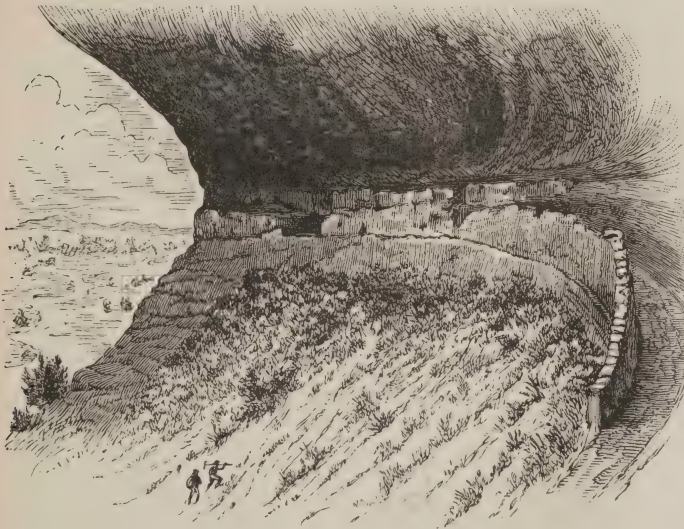


FIG. 2.—Cliff Dwellings on the San Juan, Utah.

seems probable that they resorted to the eyries in the cliffs after being dislodged from their habitations in the cañons. Their invaders may have been the ancestors of the present Utes. —The small apartments, typical of the ruined community houses of the Chaco cañon, were found in the large ruins of Colorado and Utah explored by Jackson. The pottery resembles that found elsewhere and that still used by the

above the roof of the rest of the building. On protruding masses of *débris* extending into the cañon were observed the remains of circular structures, and in crevices in the rock of the bluff were walls of undressed stone. A square two-storied house, discerned at a great height above the valley, in a cavity of the cliff, was explored. The ground plan showed a room 6 ft. by 9, behind which were two

smaller ones 5 ft. by 7; of two apertures, the one which served as a door was 20 by 30 in. There was a large semicircular cistern with a capacity for about 2½ hogsheads of water; ce-



FIG. 3.—Cliff Dwellings on the San Juan, Utah.

dar pegs were inserted between the interstices of the stones for mounting to the top to dip out water. The upper lintels of the windows were formed of round sticks of cedar of not more than a finger's breadth. The house was in two stories, having been divided by a cedar floor, of which only the ends of the beams imbedded in the wall remained. The front wall was smoothly faced, and the stones, which ranged from 15 in. in length and 8 in. in thickness down to very small ones, were carefully squared. The mortar is hard and firm; it is grayish, resembling lime, but cracking all over. Small apertures lead from one room to another. A peculiar dressing was found in the inner walls of the front rooms: they were plastered with a coating of adobe cement, of a smooth, hard finish, which was colored a deep maroon with borders of white around the edges of the walls and ceiling. Houses of the same general character, with masonry as solid as when first constructed, with angles perfectly squared and walls carefully built to the plumb line, were explored with difficulty at a height of 600 to 800 ft. above the trail; the walls were built out flush with the cliff, and only a watchful eye could descry them.—The round towers, several of which were examined by Jackson, were found near extensive heaps of ruins in the bottom of the cañons, and were evidently watch towers connected with these towns or settlements. The ground plan of one of these round structures in the cañon of the Mancos consists of two circular walls, the space between them being divided into six apartments surrounding the circular room in the centre, the diameter

of which is 12 ft., that of the outer wall being 25 ft. This tower was about 20 ft. in height originally, and was placed directly in the midst of the settlement. Another tower on the bank of the stream, 12 ft. in diameter, and now 20 ft. in height, but originally considerably higher, had adjoining it a rectangular structure, divided into two apartments, each 15 ft. square, the floor of which appears to have been considerably below the surface of the ground. The stones of which this tower was constructed are uniform in size and angles.—The remains of a town nearly a square mile in extent are situated around a spring at the water-parting between the Mancos and the McElmo. They include a massive structure about 100 ft. square, enclosing a circular apartment depressed in the centre; around the square walls were many tiers of apartments. The ruins of this enormous community dwelling consist chiefly of stone. Another similar group of ruins adjoins a heavy wall enclosing a space about 200 ft. square. A tower larger than those found in the Mancos cañon, and surrounded by a much larger settlement, was found in the cañon of the McElmo. It is about 50 ft. in diameter, and, like the one described above, double-walled; the space between, about 6 ft. broad, is divided into small apartments.



FIG. 4.—Tower on Epsom Creek, Utah.

It stands in the midst of a group of ruins about 200 yards square, which bears all the marks of the community dwellings of the Moquis and Pueblos. At a corner of this group was a second tower of smaller dimensions. On the mesa adjoining are similar groups not so well preserved. A square tower built on a large block of sandstone in the McElmo cañon was found. Another round tower, about 10 ft. in diameter and 18 ft. in height, is placed on the top of a huge boulder of sandstone of about the same diameter, resting on the edge of a

bench in the cañon half way between the foot and the summit.

CLIFFORD, William Kingdon, an English philosopher, born in Exeter, May 4, 1845, died in Madeira, March 3, 1879. He was educated at King's college, London, and at Cambridge. In 1870 he accompanied the eclipse expedition to the Mediterranean, and from 1871 to 1876 was professor of applied mathematics in University college, London. After two trips to the Mediterranean for his health, he departed in a dying condition for Madeira. He had gradually adopted the most advanced and radical position in speculative belief, finding in the facts of psychology and in the biological deductions of Darwin and others the basis for a theory in which ultimate atoms of "mind stuff," analogous to the hypothetical atoms of matter, are predicated. His philosophy is a form of idealistic monism. As a lecturer and reviewer, Prof. Clifford advocated the later theories of science, and was the author of many ingenious applications and hypotheses in connection with them. His essays and lectures, edited by Leslie Stephen and Frederick Pollock, were printed in London in 1879.

CLOISONNÉ (Fr., partitioned, divided into

in metal wire. This system is used on surfaces of metal or porcelain. It is also used without foundation of any kind, when it is called *cloisonné de plique à jour*. Of the accompanying illustrations, figs. 1 and 2 are old Chinese cloisonné on metal; figs. 3-5, modern Japanese cloisonné on metal; and fig. 6, modern Chinese cloisonné on porcelain.—When the enamel is to be laid on a metal plaque, the design is first carefully traced with a pointed instrument; the drawing is then outlined with a wire of the same metal, which is temporarily fixed with wax. When the design is entirely traced out, the wires are soldered to the plaque, and the piece is fired. It is then "cloisonné;" that is to say, it presents a network with as many cells as the design requires. All of these are now filled with the variously colored paste, which has for its basis a pure crystal glass ground up with a fine calc of lead and tin, prepared for the purpose, with the addition usually of white salt of tartar, and tinted with different oxides. The piece is again fired, the fusing of the enamel fixing the wire still more firmly, and if necessary the cells are filled again. When it leaves the furnace, the surface is rough and requires to be treated like



FIG. 1.



FIG. 2.

cells), the name given to a process of enameling in which the outline of the design is traced | plate glass—rubbed with coarse stone, then with finer, and finally polished with charcoal.

Thus it becomes like a mosaic, and by means of the brilliant slender wire one can trace out the limits of the enamel as well as the contour of the design.—In applying this system to porce-



FIG. 3.

lain, it is necessary to grind the surface in order to remove the glaze, so that the enamel will adhere to it. The design is traced first on paper, which is then covered with glass, and on this glass the wire is bent, following the



FIG. 4.

outlines below. The wire is then transferred to the vase and fixed by means of fusible glass; then the cells are filled with the enamel as above described.—The *cloisonné de plique à jour* is made by attaching the brass or copper wire in



FIG. 5.

the required design on the inside of a mould. The cells thus formed are filled with the enamel paste, and the whole is fired, and then removed from the mould. Vases are in this

manner made in sections, which are cemented together and form a cloisonné without background.—Cloisonné enamel figures among the most remarkable productions of the middle ages, but specimens of this time are extremely rare, as it was most frequently made upon a gold foundation with wire of the same precious metal. Nothing definite is known of the origin of this method; the earliest historical evidence of it is in the 6th century. The description of the principal altar of St. Sophia, after the reconstruction of this church under Justinian, can only be understood by admitting the general employment of cloisonné enamel. The art



FIG. 6.

probably reached Byzantium from the East, and from there enamellers established themselves in many parts of Italy. Rome, Venice, and Florence produced an enormous quantity of enamels, and from the peninsula they spread into France and Germany, always preserving the most pronounced oriental air. The Japanese, who send out exquisite examples of this art, learned it from the Chinese about the same time that they learned to make porcelain, in the latter part of the 16th century. At the end of this century and the beginning of the 17th the process was brought to great excellence. The art was revived about 1855. Barbedienne of Paris is the best cloisonné worker of our time.

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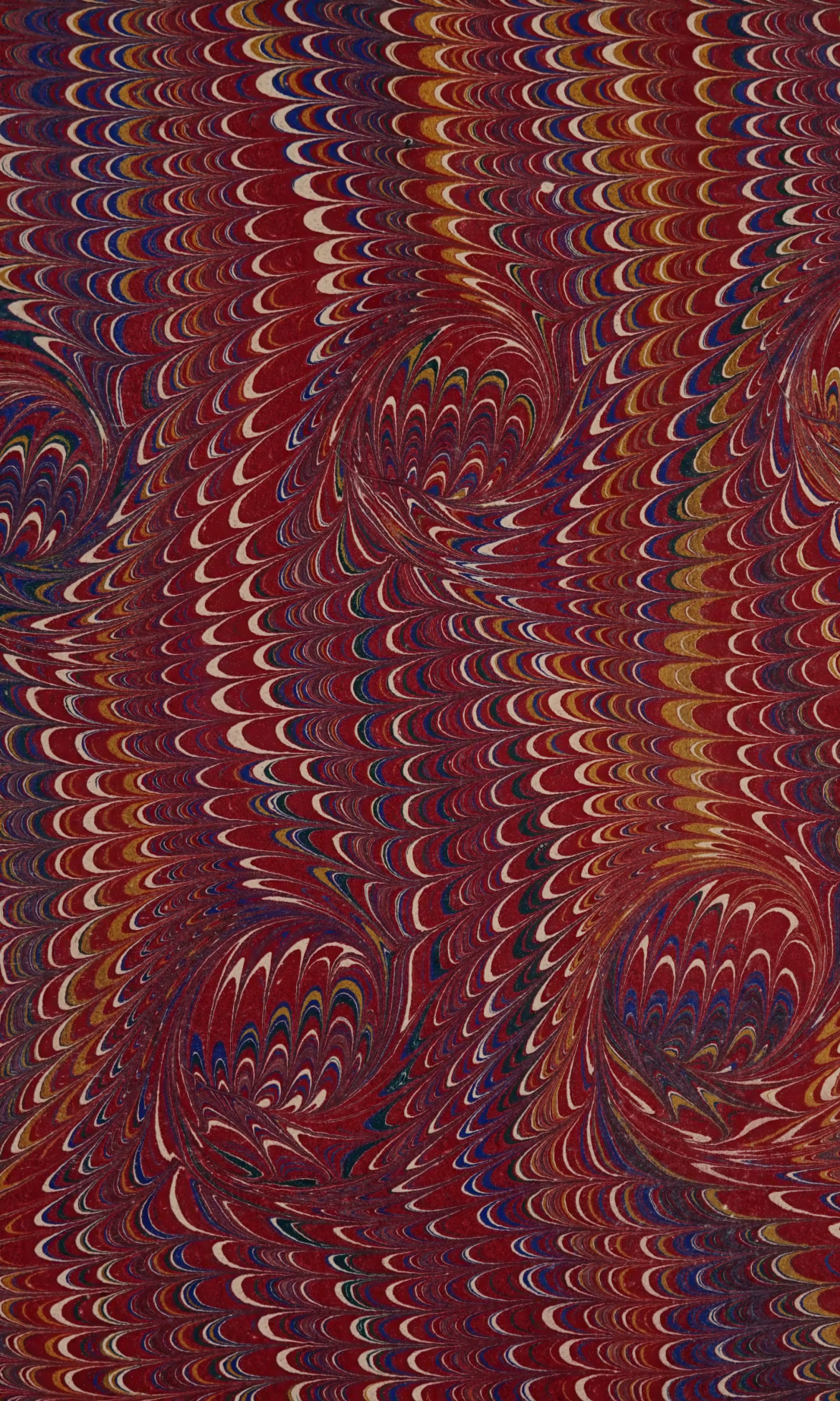
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